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Abstract

Socioeconomic status is a core determinant of health and well-being across the life span, including adolescence. The scientific literature suggests that although the overall level of health and well-being has constantly improved in Finland and other developed countries, the improvement may not be equally seen in all subgroups in the population. However, data on socioeconomic health disparities among adolescents are scarce. The aim of this study was to examine changes in four problem behaviors – bullying at school, cannabis use, smoking, and delinquency – according to socioeconomic status among Finnish adolescents between 2000 and 2015.

The material for the study was obtained from the School Health Promotion Study (SHPS), which is a nationally conducted classroom survey on the well-being, health, and school work of Finnish children and adolescents. The SHPS has been conducted biennially since 1996. This study comprises the responses of 8th and 9th graders to surveys from 2000 to 2015 (N = 761,278). The behavior variables studied were frequent bullying perpetration and victimization, any and frequent cannabis use, frequent smoking, lifelong nonsmoking, and delinquency. Socioeconomic adversities studied were low level of parental education, parental unemployment during the past year, and not living with both parents. In addition, a variable of cumulative socioeconomic adversity was created from the three socioeconomic adversities. Distributions for the problem behaviors over time in the whole sample and according to cumulative socioeconomic adversity were calculated using crosstabs and the Chi-square test. Associations between time, problem behaviors, and socioeconomic adversities were studied using binomial logistic regression, the results shown as odds ratios with 95% confidence intervals.

All the four problem behaviors studied were positively associated with each socioeconomic adversity. Most importantly, the prevalences of problem behaviors diverged between socioeconomic groups over time. Although changes in the prevalences of bullying involvement, cannabis use, and delinquency were modest in the whole sample, these prevalences increased significantly among adolescents with most socioeconomic

adversities. Similarly, the overall prevalence of frequent smoking decreased and that of lifelong nonsmoking increased over time, but these changes were not observed among adolescents with the most socioeconomic adversities. Correspondingly, the odds ratios for problem behaviors increased over the study period among adolescents with most cumulative socioeconomic adversity compared to adolescents with no cumulative socioeconomic adversity.

The findings of this study indicate that socioeconomic disparities increased in bullying at school, cannabis use, smoking, and delinquency among Finnish adolescents between 2000 and 2015. The results are alarming as these changes have occurred although reducing socioeconomic health disparities has been a central aim of Finnish health policy for decades. It seems undeniable that more concrete actions are required to reduce socioeconomic health disparities in the population. Socioeconomic adversities should be considered thoroughly in the prevention of adolescent problem behaviors. Finally, securing adequate social support as well as equal access to health and social services for everyone independent of socioeconomic status and place of residence are crucial in decreasing socioeconomic health disparities in the population.

Tiivistelmä

Sosioekonominen asema on keskeinen terveyteen ja hyvinvointiin vaikuttava tekijä läpi elämän, myös nuoruudessa. Vaikka yleinen terveyden ja hyvinvoinnin taso on Suomessa ja muissa teollisuusmaissa jatkuvasti kohentunut, tutkimusten mukaan myönteistä kehitystä ei voida yhtä lailla havaita kaikissa väestöryhmissä. Tutkimustieto sosioekonomisista terveyseroista nuorten keskuudessa on kuitenkin vajavaista. Tämän tutkimuksen tavoitteena oli tutkia suomalaisnuorten neljän ongelmakäyttäytymisen muodon – koulukiusaamisen, kannabiksen käytön, tupakoinnin ja rikekäyttäytymisen – ajallisia kehityskulkuja eri sosioekonomisissa ryhmissä vuosina 2000–2015.

Aineisto tutkimukseen hankittiin Terveyden ja hyvinvoinnin laitoksen (THL) Kouluterveyskyselyistä. Kouluterveyskysely on kansallinen suomalaislasten ja -nuorten hyvinvointia, terveyttä ja koulutyötä kartoittava kyselytutkimus, joka on toteutettu joka toinen vuosi vuodesta 1996 lähtien. Tämän tutkimuksen aineisto koostui 8. ja 9. luokkalaisten vastauksista aikavälillä 2000–2015 (N = 761 278). Tutkitut ongelmakäyttäytymismuuttujat olivat säännöllinen kiusaaminen ja kiusatuksi joutuminen, kannabiksen kokeilu ainakin kerran, tiheä kannabiksen käyttö, säännöllinen tupakointi, elämänaikainen tupakoimattomuus sekä rikekäyttäytyminen. Tutkitut sosioekonomisen huono-osaisuuden muuttujat olivat vanhempien matala koulutustaso, vanhempien työttömyys viimeisen vuoden aikana sekä asuminen muutoin kuin äidin ja isän kanssa. Edellä mainituista kolmesta muuttujasta luotiin myös kumulatiivista sosioekonomista huono-osaisuutta mittaava yhdistelmämuuttuja. Ongelmakäyttäytymisen vallitsevuus koko tutkimusjoukossa ja erikseen jokaisessa sosioekonomisessa ryhmässä laskettiin Khiin neliö -testillä. Ongelmakäyttäytymisen, sosioekonomisen aseman ja ajan välisiä yhteyksiä tutkittiin binomiaalisella logistisella regressiolla, jonka tulokset ilmaistiin vetosuhteina (odds ratio, OR) ja 95 %:n luottamusväleinä (confidence interval, CI).

Kaikki neljä ongelmakäyttäytymisen muotoa olivat yhteydessä kaikkiin tutkittuihin sosioekonomisen huono-osaisuuden mittareihin. Merkittävimpänä havaintona ongelmakäyttäytymismuuttujien ajalliset kehityskulut poikkesivat toisistaan kumulatiivisen

sosioekonomisen huono-osaisuuden mukaan luokitelluissa ryhmissä. Vaikka muutokset kiusaamisosallisuuden, kannabiksen käytön ja rikekäyttäytymisen vallitsevuudessa olivat koko tutkimusjoukon tasolla vähäisiä, niiden vallitsevuus kasvoi sosioekonomisesti huono-osaisimpien nuorten joukossa tutkimusjakson aikana. Niin ikään säännöllinen tupakointi vähentyi ja tupakkaa kokeilemattomien osuus lisääntyi tutkimusjakson aikana yleisellä tasolla, mutta vastaavia muutoksia ei havaittu sosioekonomisesti huono-osaisimpien nuorten joukossa. Ongelmakäyttäytymismuuttujien vetosuhteet kasvoivat vastaavasti tutkimusjakson aikana nuorilla, joilla oli eniten kumulatiivista sosioekonomista huono-osaisuutta verrattuna nuoriin, joilla ei ollut kumulatiivista sosioekonomista huono-osaisuutta.

Tämän tutkimuksen tulokset viittaavat siihen, että suomalaisnuorten sosioekonomiset erot koulukiusaamisessa, kannabiksen käytössä, tupakoinnissa ja rikekäyttäytymisessä kasvoivat aikavälillä 2000–2015. Tulokset ovat hälyttäviä, sillä erot ovat kasvaneet huolimatta siitä, että terveyserojen kaventaminen on ollut suomalaisen terveyspolitiikan keskeisimpiä tavoitteita vuosikymmenten ajan. Näyttää kiistattomalta, että väestön terveyserojen kaventamiseksi tarvitaan konkreettisempia toimia. Sosioekonominen huono-osaisuus tulee huomioida nuorten ongelmakäyttäytymisen ehkäisyssä ja sen vähentämiseen tähtäävissä interventioissa. Lisäksi riittävän toimeentulon turvaaminen heikoimmassa asemassa oleville sekä sosiaali- ja terveyspalvelujen yhdenvertainen saatavuus sosioekonomisesta asemasta ja asuinalueesta riippumatta ovat keskeisiä keinoja kaventaa väestön terveyseroja.

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I Knaappila, N., Marttunen, M., Fröjd, S., Lindberg, N., & Kaltiala-Heino, R. (2018). Socioeconomic trends in school bullying among Finnish adolescents from 2000 to 2015. *Child Abuse & Neglect*, 86, 100–108.

II Knaappila, N., Marttunen, M., Fröjd, S., Lindberg, N., & Kaltiala-Heino, R. (2019). Socioeconomic trends in adolescent smoking in Finland from 2000 to 2015. *Journal of Adolescent Health*, 64(6), 776–782.

III Knaappila, N., Marttunen, M., Fröjd, S., Lindberg, N., & Kaltiala-Heino, R. (2019). Changes in delinquency according to socioeconomic status among Finnish adolescents from 2000 to 2015. *Scandinavian Journal of Child and Adolescent Psychiatry and Psychology*, 7, 52–59.

IV Knaappila, N., Marttunen, M., Fröjd, S., Lindberg, N., & Kaltiala, R. (2019). Changes in cannabis use according to socioeconomic status among Finnish adolescents from 2000 to 2015 (submitted).

Abbreviations

ADHD	attention deficit hyperactivity disorder
CBD	cannabidiol
CI	confidence interval
COPD	chronic obstructive pulmonary disease
ESPAD	European School Survey Project on Alcohol and Other Drugs
FSH	follicle-stimulating hormone
GnRH	gonadotropin-releasing hormone
HPA	hypothalamic-pituitary-adrenal (axis)
LH	luteinizing hormone
OR	odds ratio
SES	socioeconomic status
SHPS	The School Health Promotion Study
THC	tetrahydrocannabinol
THL	Terveyden ja hyvinvoinnin laitos (The National Institute for Health and Welfare)

1 Introduction

Socioeconomic status is a core determinant of health and well-being across the life span (Marmot, 2003). Socioeconomic disparities exist in all areas of health and can be found in all age groups (Fiscella et al., 2004). Low socioeconomic status is associated with increased mortality, somatic and psychiatric morbidity, poor subjective health, impaired quality of life, and unhealthy behaviors, such as smoking, alcohol use, and poor diet (Chetty et al., 2016; Clegg et al., 2009; Frederick et al., 2014; Klein et al., 2016; Park et al., 2013; Sleskova et al., 2006; Torikka et al., 2017; Wallace et al., 2009; Wang et al., 2015).

Scientific data indicate that socioeconomic health disparities have increased in Finland over the past decades although decreasing them has been a central aim of Finnish health policy since the 1970s (Rotko et al., 2011). Increased socioeconomic disparities have been observed in life expectancy, morbidity, and health-related behaviors (Lahelma et al., 2019; Lumme et al., 2018; Piha et al., 2007; Ruokolainen et al., 2019a). Less is known about the time trends in socioeconomic health disparities among adolescents. However, increased disparities have been observed in the form of adolescent smoking, depression, and alcohol consumption in recent decades (Doku et al., 2010; Torikka et al., 2017; Torikka et al., 2014).

Adolescence marks a vulnerable period in life (Hayford et al., 2008). Due to drastic physiological, psychological, and social changes, risk-taking behaviors become common in adolescence (Hayford et al., 2008). Problem behaviors, such as smoking, substance use, and delinquency, can serve the adolescent as a means of making a developmental transition toward adulthood (Jessor & Jessor, 1977). Engaging in problem behaviors is more common among adolescents from low socioeconomic backgrounds (Delva et al., 2005; Elonheimo et al., 2009; Kuntz et al., 2016). Problem behaviors, such as smoking, cannabis use, delinquency, and bullying at school, often begin in adolescence and have long-lasting consequences for health and well-being later in life (Jessor & Jessor, 1977). Therefore, socioeconomic disparities in adolescent problem behaviors contribute greatly to socioeconomic health disparities in adulthood. However, data on the time trends in adolescent problem behaviors according to socioeconomic status are lacking.

The causes for socioeconomic health disparities are rooted in society and socio-political decision-making. As a consequence of a major economic recession in the 1990s, long-term unemployment increased markedly in Finland (Palosuo et al., 2009). Due to cuts in social security benefits, income inequality has kept increasing, and child poverty especially has tripled since the 1990s (Rotko et al., 2011). Marked cuts in alcohol taxes in 2004 have also had a significant effect on socioeconomic health disparities, as alcohol consumption explains the majority of differences in morbidity and mortality between socioeconomic groups (Palosuo et al., 2009). Finally, regional differences in the accessibility of health and social services, especially primary healthcare and child protection services, contribute to health disparities in the population (Manderbacka et al., 2019).

There are numerous reasons why narrowing socioeconomic health disparities is profitable. First, public health improves most when interventions are targeted at groups with the most morbidity (Marmot, 2003). Second, improving the health of the most ill helps to ensure the sufficiency of health services in the aging population (van der Heyden et al., 2003). Third, narrowing socioeconomic health disparities enhances social cohesion and decreases social marginalization and unemployment (Lallukka et al., 2019). Fourth, preventing illness among those at greatest risk for ill health produces several cost benefits for the public economy and individual households (Thornton et al., 2016). Health promotion and preventing morbidity are cheaper than the treatment of illnesses (Thornton et al., 2016). Fifth, socioeconomic health disparities cannot be ethically condoned as they are preventable and contrary to the ideology of a welfare state (Braveman et al., 2011).

To decrease socioeconomic health disparities in the population, scientific knowledge about the time trends in health disparities is essential. Data on the association between health and the different dimensions of socioeconomic status help with planning targeted interventions for those in the most vulnerable position.

1.1 Adolescence

1.1.1 Definition of adolescence

Adolescence is the transition period between childhood and adulthood (Hayford et al., 2008). It starts with the onset of puberty and ends in young adulthood (Sawyer et al., 2018). The age definition of adolescence has varied over studies and over time. Historically, adolescence was considered to span from 12 to 19 (Sawyer et al., 2018). However, due to improved nutrition and health the onset of puberty has shifted over time to a younger age (Sawyer et al., 2018). In addition, the adoption of adult social roles, including marriage and parenthood, is ever increasingly postponed to older age in today's society (Hayford et al., 2008). Therefore today the definition of adolescence has been widened and is considered to span from 10 to 24 (Sawyer et al., 2018).

Although the age definition of adolescence has varied over time, the role of adolescence as a transition period from childhood to adulthood has remained the same. Similarly, adolescence marks a period of increased vulnerabilities and risks inherent in this transition period and these have not fundamentally changed over time.

1.1.2 Development in adolescence

Adolescence is time of rapid growth and development (Marceau et al., 2011). It involves dramatic biological, psychological, and social changes (Marceau et al., 2011). The biological changes start by the secretion of gonadotropin-releasing hormone (GnRH) from the hypothalamus (Peper et al., 2011). GnRH causes a release of luteinizing hormone (LH) and follicle-stimulating hormone (FSH) from the anterior pituitary, which in turn leads to a surge in the secretion of sex hormones (estrogen, progesterone, and testosterone) from the gonads (Peper et al., 2011). The increased levels of sex hormones result in the development of the secondary sexual characteristics, the aim of which is to achieve reproductive maturity (Marceau et al., 2011). Today the average age of the onset of puberty is 10 in girls and approximately one or two years later in boys (Aksglaede et al., 2009; Marceau et al., 2011). However, there is considerable individual variation in the timing and tempo of puberty (Marceau et al., 2011).

Another central area of biological development in adolescence is the brain. Developmental changes in the adolescent brain include synaptogenesis, synaptic pruning, and myelinogenesis (Giedd, 2008). The sex hormones are critically involved in the adolescent brain development (Peper et al., 2011). Brain maturation proceeds during adolescence particularly in the frontal lobe, which plays a central role in impulse control, social and sexual behaviors, and decision-making (Arain et al., 2013). Additionally, the limbic system, which is involved in emotion regulation and memory, is under construction in adolescence (Giedd, 2008). The last area to mature is the prefrontal cortex, which is responsible for the cognitive control of emotions and impulses (Arain et al., 2013). The brain continues to mature until approximately 25 years of age (Arain et al., 2013).

In addition to biological development, adolescence involves important psychological and social changes. These changes can be seen as developmental tasks, the successful resolution of which leads to the achievement of psychosocial adulthood (Ragelienė, 2016). According to Erikson (1950), the most important developmental tasks in adolescence are gaining independence from parents, forming meaningful relationships with peers, and constructing one's unique identity. Identity provides a sense of continuity within the self and in interaction with others (self-sameness) as well as a frame to differentiate between self and others (uniqueness) (Erikson, 1950). The importance of parents declines and relationships with peers become a central part of adolescent life (Ragelienė, 2016). A peer group not only offers emotional support, but also provides the social status necessary for identity development (Ragelienė, 2016). Blos (1967) also described adolescence as the

time for the second individuation process, which denotes a chance for the adolescent to renegotiate developmental aberrancies formed in earlier childhood relationships.

1.1.3 Increased vulnerability in adolescence

Being a time of tumultuous change, adolescence is also characterized by increased vulnerability (Paus et al., 2008). As adaptation to several physiological, psychological, and social changes is required in order to achieve a balanced adulthood, failure in any of these processes can lead to developmental disturbances (Paus et al., 2008). Therefore, adolescence is a critical period for the onset of psychiatric morbidity: 20–25% of adolescents suffer from a mental health disorder (Patel et al., 2007). In addition, most psychiatric morbidity in adolescence persists into adulthood (Paus et al., 2008), and indeed three in every four adult mental health disorders start before the age of 24 (Patel et al., 2007). As mental health disorders become more difficult to treat the longer the illness history, the role of prevention and early intervention is crucial (Patel et al., 2007).

In addition to developmental aberrancies, normative changes in the developing adolescent brain also subject adolescents to risk taking and pleasure seeking, which increase the risk for problem behaviors (Arain et al., 2013). According to the problem-behavior theory by Jessor & Jessor (1977), engaging in behaviors considered problematic in this age group, such as alcohol consumption, smoking, and risk-taking sexual behaviors, can also serve as a way of laying claim to a more mature status and making a developmental transition toward adulthood. However, even though risk-taking behaviors, mental health problems, and substance use are common in adolescence, the majority of adolescents manage this developmental period without severe disorders (Paus et al., 2008). Therefore, psychiatric morbidity among adolescents should by no means be considered normative but instead be addressed early on to prevent the continuation of problems into later life (Das et al., 2016).

1.2 Socioeconomic status

1.2.1 Definition of socioeconomic status

Socioeconomic status (SES) is one of the core determinants of health and well-being in all phases of life (Galobardes et al., 2006a; Galobardes et al., 2006b; Härkönen et al., 2018; Viner et al., 2012), including adolescence (Amato et al., 1991; Areba et al., 2018; Bacikova-Sleskova et al., 2015; Fuller-Thomson et al., 2013; Torikka et al., 2014; Torikka et al., 2017). SES depicts an individual's or group's relative position within a society (Galobardes et al., 2006a; Galobardes et al., 2006b). It is an aggregate concept comprising resource-based (such as material and social resources) and prestige-based (individual's rank or status) indicators of socioeconomic position (Krieger et al., 1997). A variety of terms, such as social class and

socioeconomic position, have been used interchangeably with socioeconomic status in the scientific literature. In this dissertation, I use the term socioeconomic status, as it has been widely used in the scientific literature worldwide.

There is no universal measure for SES in the scientific literature. Instead, numerous alternative and complementary measures have been used across studies. SES can be measured at individual, household, neighborhood and society levels (Krieger et al., 1997). The assessment of socioeconomic status may involve an individual proxy measure, such as education, income, or occupation, or consist of multiple measures that provide an overall index of socioeconomic status (Galobardes et al., 2006a; Galobardes et al., 2006b). No consensus exists on the best way of measurement (Saegert et al., 2007). Different measures of SES are intercorrelated as socioeconomic disadvantage tends to cluster among the same individuals; for instance, low level of education is associated with low income and unemployment (Bask et al., 2015).

The measurement of SES is especially challenging among adolescents. As the final level of education is yet to be acquired in adolescence, the education level cannot be used to measure adolescent SES. For the same reason employment status cannot be used as an indicator of SES in adolescence. Consequently, parental SES has often been used in scientific research as a proxy measure of adolescent SES. Using parental SES as an indicator of adolescent SES is justified as parental SES has indeed a strong predictive value on adolescent outcomes, including well-being and health (Viner et al., 2012). Furthermore, it also predicts the socioeconomic status of the adolescent later in adulthood (Slominski et al., 2011). Recently measures to assess the adolescent's own SES have also been introduced, among the academic performance, but their use is not well established (Magklara et al., 2012; Sweeting et al., 2014). Therefore, in this dissertation, adolescent socioeconomic status was measured through family SES: parental education, parental unemployment in the past year, and family structure. All three measures have been widely used in the scientific literature to measure adolescent SES, as will be discussed in the following section. Low level of parental education, parental unemployment, and not living with both parents are hereafter referred to as socioeconomic adversities.

1.2.2 Socioeconomic status and health

Socioeconomic disparities can be seen systematically in all areas of health and well-being, so that the level of health and well-being increases along with the socioeconomic status (Marmot, 2003). This is called the social gradient in health (Marmot, 2003). Socioeconomic status affects health through a variety of different mechanisms. The pioneering Black Report (Department of Health and Social Security, 1980) published in England identified four types of explanation for the association between socioeconomic status and health.

According to the most controversial explanation, i.e. the artefact explanation, the association between socioeconomic status and health does not actually exist; instead,

according to this approach, the associations observed in studies are due to methodological weaknesses in the analyses (Department of Health and Social Security, 1980). This explanation has subsequently been rejected (Blane, 1985).

The selection explanation points to reverse causality: health affects people's social mobility and thereby socioeconomic status (Department of Health and Social Security, 1980). Health is a resource that helps in climbing the social ladder (Department of Health and Social Security, 1980). Healthy people are more likely to be upwardly mobile, whereas those in poor health are prone to go down in the social hierarchy (Department of Health and Social Security, 1980). This explanation has gained empirical support; however, it only partly explains the association between SES and health (Blane, 1985).

The third approach involves cultural and behavioral explanations, which state that socioeconomic health disparities are a result of differences in health-related behaviors, such as the consumption of alcohol, smoking, eating habits, exercise, and the utilization of health services (Department of Health and Social Security, 1980). These explanations are firmly established in medicine and today considered the most reliable explanations of socioeconomic health disparities (Blane, 1985). However, they have also been criticized for putting too much emphasis on the autonomy of people's behavior (Blane, 1985).

Materialistic explanations, like cultural and behavioral explanations, acknowledge a causal relationship between socioeconomic status and health. However, they do not consider health disparities a result of autonomous behavior, but instead as an inevitable consequence of structures in society. Several societal factors, such as income distribution, education, and working and living conditions, affect people's health. Of the two approaches, behavioral factors are seen to make the larger contribution to health disparities, material factors being secondary and playing a minor part (Blane, 1985). However, it has been noted that cultural/behavioral and materialistic explanations are so tied together, behavior mediating the link between societal structures and health, that the distinction between the two is artificial (Blane, 1985).

In addition to the explanations of socioeconomic health disparities in The Black Report, Graham and Kelly (2004) presented a model of the pathway through which health determinants lead to health outcomes. According to the model, societal structures, such as the labor market, the education system and income distribution, are decisive in the determination of the individual's socioeconomic status. Socioeconomic status in turn impacts on one's health and well-being through mediating factors, such as living and working conditions, health-related behavior, and access to health services. The model is bidirectional, so that poor health can decrease one's opportunities to pursue a higher socioeconomic status, whereas good health makes it easier to move up the social ladder.

Although SES is a significant determinant of health, not everyone from low socioeconomic background develops ill health, and some people with socioeconomic adversities are healthier than those without such adversities. Even though socioeconomic adversities increase the risk for ill health, the individual's health is a result of the combined

effect of several risk and protective factors (Bircher et al., 2014). For instance, an adolescent with socioeconomic adversities may have other resources, such as resilience against adversities, positive role models, and well-functioning emotion regulation skills, which help in maintaining good health (Chen et al., 2012).

Of the indicators of family SES, parental education is perhaps the best-established determinant of adolescent health and well-being. Parental education protects adolescents against several health problems, including physical illness (Matthiessen et al., 2014; Yu, 2015), substance abuse (Torikka et al., 2017; Wells et al., 2018), and mental health problems (Park et al., 2013; Torikka et al., 2014). Parental education is linked to adolescent health both directly and indirectly. First, it equips parents with skills to better collect and process information, which directly aids them in achieving better life outcomes for themselves and their children (Saegert et al., 2007). Second, high level of education is associated with high income as well as psychosocial resources, which indirectly mediate the association between parental education and adolescent health (Ross et al., 1995).

Parental unemployment, especially long-term unemployment, is also strongly associated with adolescent health and well-being. It has been linked to poor mental health and self-rated health of the adolescent, even after controlling for parental education and income (Bacikova-Sleskova et al., 2015; Fuller-Thomson et al., 2013; Moustgaard et al., 2018; Sleskova et al., 2006). Parental unemployment affects adolescent health in multiple ways. Unemployed parents are prone to economic hardship, parental conflicts (Conger et al., 1994), and physical and mental illness (Jin et al., 1995), which are associated with impaired adolescent well-being (Conger et al., 1994; Dashiff et al., 2009). Although father's unemployment has been studied more thoroughly in the scientific literature, both paternal and maternal unemployment are associated with impaired adolescent health (Sleskova et al., 2006).

The association between adolescent health and family structure is less straightforward than that between adolescent health and parental education or unemployment, although it has also been widely studied in the scientific literature (Areba et al., 2018; Carlson et al., 2001; Du et al. 2015; Turner et al., 2007). Overall, the scientific evidence over time indicates that children living in family constellations other than with mother and father experience on average more mental health problems, substance abuse, and physical illness than children living with both parents, although the associations are modest (Amato et al., 1991; Areba et al., 2018; Bramlett et al., 2007). Potential explanations include that adolescents living with both mother and father have on average a higher standard of living, receive more effective parenting, are emotionally closer to both parents, and have experienced fewer stressful life events than adolescents living in other family constellations (Amato et al., 1991; Areba et al., 2018). However, the findings are not consistent across studies (Amato, 2005; Blum et al., 2000; Carlson et al., 2001). Furthermore, in past decades the whole concept of family structure has been under drastic change: in addition to families with mother and father, single-parent families, and stepfamilies, an increasing number of children live with two

mothers, two fathers, or in other family structures that have not been taken into account in earlier research (Bevacqua, 2018; Bos et al., 2016). It also has to be noted that considerable variation exists between families: in some mother-and-father families adolescents face a great deal of health hazards, such as parental conflicts or parental substance abuse, and on the other hand, the majority of other family constellations provide adolescents with safe and healthy living conditions (Amato et al., 1991).

1.2.3 Trends in socioeconomic health disparities

Scientific evidence suggests that although the overall level of health and well-being has constantly risen in developed countries, the improvement may not be as evident in the lowest socioeconomic groups. Increased socioeconomic health disparities have been observed in several developed countries, including Finland (Bosworth, 2018; Lahelma et al., 2019; Lumme et al., 2018; Piha et al., 2007; Regidor et al., 2006; Ruokolainen et al., 2019a; Weinberger et al., 2018). In Finland, socioeconomic health disparities have continually increased although narrowing them has been a central aim of Finnish health policy since the 1970s (Rotko et al., 2011). The greatest increase has been observed in differences in life expectancy: the life expectancy of a 25-year-old woman in the highest income quintile is almost five years longer than that of a woman of the same age in the lowest income quintile (Terveyden ja hyvinvoinnin laitos, 2019). For men, the corresponding difference is nine years (Terveyden ja hyvinvoinnin laitos, 2019). The majority of the disparities are due to differences in alcohol consumption, smoking, and vascular diseases (Terveyden ja hyvinvoinnin laitos, 2019).

Contrary to adults, less is known about the trends in socioeconomic health disparities among adolescents. However, a growing number of studies have observed increased socioeconomic disparities in adolescent health as well. In a time-series study involving 34 European and North American countries (Elgar et al., 2015), socioeconomic disparities increased in physical activity as well as physical and psychological symptoms among adolescents between 2002 and 2010, when family affluence scale (FAS) was used to measure SES. Frederick et al. (2014) observed that obesity started to decline in the US after 2002 among adolescents with high socioeconomic status but continued to increase among adolescents with low socioeconomic status. Parental education and income were used to measure SES. Increased socioeconomic disparities in adolescent obesity were also observed in a time-trend study conducted in Czech Republic, when SES was measured by family affluence scale (Sigmund et al., 2020). Torikka et al. (2014) observed that although changes in the prevalence of self-rated depression were modest among Finnish adolescents between 2000 and 2011, among adolescents with most socioeconomic adversities the prevalence of self-rated depression nearly doubled. Similarly, Torikka et al. (2017) observed that although the overall prevalences of frequent drinking and drunkenness decreased in Finland between 2000 and 2011, among socioeconomically deprived adolescents with

depression, the likelihoods increased. Increased disparities according to parental education were also observed in smoking among Finnish adolescents (Doku et al., 2010). All in all, these findings suggest that socioeconomic disparities in adolescent health have increased in developed countries in past decades.

1.3 Problem behaviors

1.3.1 Definition of problem behavior

According to the problem-behavior theory by Jessor and Jessor (1977), problem behavior denotes behavior that departs from the norms of the larger society, is undesirable according to the social or legal norms of conventional society and its institutions of authority, and usually elicits some form of social control response, whether minimal, such as a statement of disapproval, or extreme, such as incarceration. Common examples of these behaviors include alcohol and illicit drug use, smoking, precocious sex, and delinquency (Jessor & Jessor, 1977). Defining a behavior as problematic is dependent on the age of the perpetrator: what may be proscribed for the young may be permitted for grown-ups (Jessor et al., 1991). Individual proneness to a problem behavior is determined by the sum of multiple personal and environmental risk and protective factors, and also engagement in other problem behaviors (Jessor, 1992).

In this dissertation, the term problem behavior is used when collectively referring to the four behaviors studied, i.e. bullying at school, cannabis use, smoking, and delinquency. All these four variables meet the criteria of a problem behavior. First, they all are perceived as non-normative and undesirable by society and/or the legal system. Second, the risk of these behaviors is determined by personal and environmental risk and protective factors. An exception to this is bullying victimization, which denotes subjection to a problem behavior, i.e. bullying. However, I wanted to include bullying victimization in this study as it is closely intertwined with bullying perpetration, and above all as it is a great burden on adolescent health and well-being. Each of the four problem behaviors is discussed separately in the following sections.

1.3.2 Bullying at school

Countries throughout the world have identified bullying at school as a leading health concern among adolescents (Craig et al., 2009; Due et al., 2005). Bullying is defined as negative behavior that I) is intentional, II) occurs repeatedly over time, and III) involves a power imbalance between the perpetrator and the victim (Olweus, 1994). Therefore, a dispute between two roughly equal individuals is not considered bullying, neither is an act with unintended negative consequences. Bullying may manifest in forms of direct physical

or verbal acts, such as hitting, pushing, or name-calling, or in indirect forms, such as talking behind someone's back or spreading rumors (Wolke et al., 2015). Since the advent of the Internet and social media, bullying has also spread to the virtual world (Caravaca Sánchez et al., 2016). Bullying that takes place online has been termed cyberbullying (Caravaca Sánchez et al., 2016). In this dissertation, I focus on traditional forms of bullying only, and cyberbullying is therefore not included. When referring to both bullying victimization and bullying perpetration, the term bullying involvement is used.

Bullying is a group phenomenon (Salmivalli, 2009). Bullies use bullying as a means of gaining power, dominance, and status in the social hierarchy (Salmivalli, 2009). Therefore, in order to succeed, bullying behavior needs to be condoned by the other members of the group, either by actively supporting the bully or by passively allowing the behavior to continue (Thornberg et al., 2012). On the other hand, defending the victim has been shown to decrease bullying (Salmivalli et al., 2011). Bullying often takes place in groups that are involuntary, which means that the victim cannot easily escape the situation (Salmivalli, 2009). Therefore, the school environment provides a propitious ground for bullying to occur (Salmivalli, 2009).

Boys are more often involved in bullying than girls both as perpetrators (Jansen et al., 2011; Vieno et al., 2015) and as victims (Aho et al., 2016; Due et al., 2009; Nordhagen et al., 2005; de Oliveira et al., 2015; Sung Hong et al., 2016; Vieno et al., 2015). On the other hand, bullying research has traditionally focused on direct forms of bullying only, and these are more common among boys, whereas the indirect forms of bullying that are more typical of girls, such as gossiping and social exclusion, are rarely elicited in bullying surveys. In addition to sex, age and developmental stage are also associated with the forms of bullying: physical bullying is most often seen among young children, whereas verbal bullying arises along with the development of verbal skills (Björkqvist et al., 1992). The more subtle, indirect forms of bullying become predominant along with the social development (Björkqvist et al., 1992).

Anyone can be subjected to bullying. However, certain factors may increase the risk. Adolescents perceived as different in some way frequently tend to be selected as targets of bullying (Merrill et al., 2016). The perceived difference may be anything from appearance to personality traits or interests (Merrill et al., 2016, Smokowski et al., 2005). Victims of bullying tend to be more sensitive, insecure, and submissive, and less assertive than their peers (Smokowski et al., 2005). Mental health problems, especially internalizing disorders, also increase the risk of being bullied (Kaltiala-Heino et al., 2010; Kaltiala-Heino et al., 2011; Merrill et al., 2016; Seo et al., 2017). On the other hand, depressed individuals tend to interpret the actions of others more negatively, and may therefore experience being subjected to bullying more often than those without depression (Kaltiala-Heino et al., 2010). Poor relationships with parents and lack of parental support are also associated with bullying victimization (Seo et al., 2017).

Common traits among bullies are aggressiveness, low tolerance of frustration, and deriving pleasure from dominating others (Smokowski et al., 2005). Bullies have a tendency to interpret other people's neutral or even affirmative behaviors as antagonistic (Smokowski et al., 2005). However, not all bullies meet the classic characteristics of a bully: bullies may also be popular, socially adept, and highly manipulative (Peeters et al., 2010). These traits help perpetrators to gain support and acceptance for their behavior in the peer group and convince authorities of their innocence (Peeters et al., 2010). Conduct problems, attention deficit hyperactivity disorder (ADHD), and personality defects are common among bullies (Smokowski et al., 2005). Bullies often perform poorly at school and engage in other problem behaviors as well, such as substance use and delinquency (Gaete et al., 2017; Smokowski et al., 2005). Lack of parental monitoring as well as hostile and indifferent parenting styles increase the risk for bullying perpetration (Smokowski et al., 2005).

When it comes down to the risk factors, both bullying victimization and perpetration have also been associated with socioeconomic adversities. Bullying victimization has been observed to be associated with parental unemployment (Delfabbro et al., 2006; Nordhagen et al., 2005; de Oliveira et al., 2015) and low parental level of education (Jansen et al., 2012; Nordhagen et al., 2005; de Oliveira et al., 2015). Living with two parents has been observed to protect adolescents against bullying (Aho et al., 2016; Jablonska et al., 2007; Nordhagen et al., 2005), whereas living in a nonintact family has been found to increase the risk of bullying victimization (Jablonska et al., 2007; Nordhagen et al., 2005). The association between SES and bullying perpetration has been less studied than that between SES and bullying victimization. Magklara et al. (2012) found that bullying perpetration was associated with father's unemployment. Adolescents with low level of parental education are more likely to bully others than are those with higher level of parental education (Jansen et al., 2012; Shetgiri et al., 2012). In addition, some studies have observed living in a nonintact family to increase the risk for bullying perpetration (Jansen et al., 2011; Jansen et al., 2012; Shetgiri et al., 2012).

Experiencing bullying has multiple effects on the body. Being bullied activates the stress system centered on the hypothalamic-pituitary-adrenal (HPA) axis (Ouellet-Morin et al., 2011; Vaillancourt et al., 2013). Repeated bullying causes chronic stress and leads to dysregulation of the HPA axis, which is inappropriate and detrimental to health (Ouellet-Morin et al., 2011; Vaillancourt et al., 2013). Long-lasting stress from being subjected to bullying disturbs the circadian rhythm, leads to emotional dysregulation, and causes chronic low-grade inflammation marked by increased C-reactive protein (CRP) levels in adolescence and still in adulthood (Copeland et al., 2014; Kelsey et al., 2017; Koch et al., 2017). Being bullied also has enduring effects on the function of several brain areas (du Plessis et al., 2018, Koch et al., 2017, Milad et al., 2012). Bullying victimization impacts the emotional brain circuits, including the prefrontal cortex, hippocampus, and amygdala (du Plessis et al., 2018, Koch et al., 2017, Milad et al., 2012). Normally, the prefrontal-amygdala circuits work to suppress negative and unpleasant memories in the process called

fear extinction (Milad et al., 2012). However, stressful experiences such as bullying may interfere with this function so that the traumatic memories persist inappropriately (Milad et al., 2012). Subjection to bullying is also associated with epigenetic changes, such as altered DNA methylation and accelerated telomere erosion (Ouellet-Morin et al., 2013; Shalev et al., 2013, Vaillancourt et al., 2013).

All things considered, it is clear that subjection to bullying has devastating and far-reaching consequences for adolescent health and well-being. It predisposes adolescents to mental health problems, such as depression, anxiety, and substance abuse, and the increased risk persists long into adulthood (Copeland et al., 2013; Kaltiala-Heino et al., 2010; Ledwell et al., 2015; Moore et al., 2017; Reijntjes et al., 2010; Sigurdson et al., 2015, Sourander et al., 2000). Victims of bullying are also at increased risk of committing suicide (Smokowski et al., 2005). In addition to psychiatric morbidity, subjection to bullying is associated with sleep disturbances, impaired physical health, poor academic performance, and increased risk of social marginalization later in life (Hunter et al., 2014; Wolke et al., 2015).

Bullying perpetration is associated with personality disorders and externalizing problems, such as conduct disorder; however, bullying others is more likely to be a manifestation of underlying mental health disturbances than a cause for them (Copeland et al., 2013; Kaltiala-Heino et al., 2010; Stuart et al., 2014). Furthermore, bullying perpetration is associated with other problem behaviors, such as substance abuse and delinquency, and the association continues into adulthood (Hemphill et al., 2011). As adults, adolescent bullies are also more likely than others to commit crimes and display physical aggression towards their family members (Smokowski et al., 2005).

A meta-analysis of 80 studies reported a mean prevalence of 35% for both bullying victimization and bullying perpetration with substantial variation across studies (Modecki et al., 2014). Variations in prevalences between studies and countries may be due to differences in the measurement of bullying across studies as well as cultural differences in the types of bullying. Most bullying takes place in middle school, although it occurs at all ages (Wang et al., 2012). According to time trend studies, the prevalence of bullying involvement may have declined in past decades (Chester et al., 2015; Finkelhor et al., 2014; Perlus et al., 2014; Vieno et al., 2015). Unfortunately, however, bullying continues to be one of the most significant factors impairing the well-being of adolescents (Caravaca Sánchez et al., 2016). In addition, no studies have investigated whether the prevalence of bullying has declined over time in all socioeconomic groups.

1.3.3 Smoking

Smoking tobacco is the leading cause of preventable morbidity and mortality worldwide (Moor et al., 2015). Approximately half of all smokers die prematurely from a smoking-related illness (Doll et al., 2004). Tobacco smoke contains more than 5,000 different chemicals, of which at least 98 are known to be toxic or carcinogenic for humans (Talhout

et al., 2011). Smoking is a major cause of cardiovascular diseases, chronic obstructive pulmonary disease (COPD), as well as various types of cancer, most importantly lung cancer (Saha et al., 2007). In addition to active smoking, passive exposure to tobacco smoke, i.e. passive smoking, is likewise detrimental to health (Cao et al., 2015; Sikorska-Jaroszyńska et al., 2012).

Tobacco smoke contains nicotine, which is one the most addictive substances known (Crane, 2007). When tobacco smoke is inhaled into the lungs, nicotine enters the circulation and moves into the brain within seconds (Dajas-Bailador et al., 2004). In the brain, it binds to the nicotinic acetylcholine receptors, which causes a variety of neurotransmitters to be released, including dopamine (Dajas-Bailador et al., 2004). Dopamine is responsible for the pleasurable sensation caused by smoking and is central to the development of nicotine addiction (Nestler, 2005). Repeated smoking causes changes in the nicotine receptors, which leads to tolerance and withdrawal symptoms (Roh, 2018).

Smoking is typically initiated in adolescence: 80% of smokers begin smoking by 18 years of age (Benowitz, 2010). Early smoking initiation increases the severity of nicotine dependence as the developing brain is more vulnerable to changes leading to addiction (Placzek et al., 2009). Indeed, most adolescent smokers continue to smoke in adulthood (Orlando et al., 2004). Due to the high addictiveness of nicotine, smoking cessation rates are low: it is a lot easier for a nonsmoker to refrain from smoking than for a smoker to quit (Roh, 2018). Therefore, adolescence is a critical period for the prevention of nicotine dependence and smoking-related illness (Orlando et al., 2004).

Several risk factors of adolescent smoking have been identified in the scientific literature. Boys are more likely to smoke and also initiate smoking earlier than girls (Okoli et al., 2013). Social influences, such as smoking parents (Selya et al., 2012) and peers (Audrain-McGovern et al., 2009) also play a major role in smoking initiation among adolescents. In addition, genetic factors (Lessov-Schlaggar et al., 2008), stressful life events (Pampel et al., 2015), and mental health problems (Audrain-McGovern et al., 2009) increase the risk for smoking initiation and nicotine dependence among adolescents.

Socioeconomic status is also a risk factor for adolescent smoking. Low level of parental education (Moberg et al., 2001; Wallace et al., 2009) and parental unemployment (Vuolo et al., 2013) are positively associated with smoking among adolescents. Smoking is more common among adolescents living in a nonintact family than among adolescents living with two parents (Du et al., 2015; Ledoux et al., 2002).

According to the diffusion of innovations theory by Rogers (1962), innovations tend to gain ground first among people in high socioeconomic groups and later spread to lower socioeconomic groups. This theory has been applied to smoking as well. Lopez et al. (1994) created a tobacco epidemic model, which describes the stages of the diffusion of smoking in a population. In stage I, smoking starts among men, and in stage II, the prevalence starts to increase among women as well. As knowledge of the health hazards of smoking increases, smoking starts to level off and decrease (stage III). The prevalence of smoking starts to

decrease first in high socioeconomic groups, and therefore socioeconomic disparities in smoking become apparent (stage IV). Many European countries, including Finland, have reached the fourth stage of the tobacco epidemic model in the 21st century, where the prevalence of smoking is decreasing at the population level, but socioeconomic disparities in smoking persist (Huisman et al., 2005).

Since the scientific evidence on the health hazards of smoking started to accumulate, a lot has been done to reduce smoking worldwide (Stoner et al., 2006). Finland has been one of the world's pioneer countries in reducing smoking since 1977, when the Tobacco Act came into force (Helakorpi et al., 2008). The Tobacco Act aimed at reducing the health risks of smoking through legislation (Helakorpi et al., 2008). Today the main areas and measures for implementing tobacco policy in Finland are health education, price policy, and smoking restrictions (Ruokolainen et al., 2019a). Finland was moreover the first country to set an official goal to end tobacco smoking completely (Ministry of Social Affairs and Health, 2018). The current objective is that by 2030, less than 5% of the Finnish working-age population will be smoking or using other nonmedicinal nicotine products on a daily basis (Ministry of Social Affairs and Health, 2018).

Due to awareness of the health hazards of smoking and the following changes in legislation and people's attitudes, the prevalence of smoking has continuously declined in most developed countries in the 21st century (Simpson et al., 2010; Giskes et al., 2005; Ruokolainen et al., 2019a). Similar to smoking among adults, adolescent smoking has also started to decline (Gadalla, 2012; Gielkens-Sijstermans et al., 2010; Kuntz et al., 2016; Moberg et al., 2001; Rasmussen et al., 2009; Ruokolainen et al., 2019b; Wallace et al., 2009). In Europe, approximately 12% of adolescent boys and 11% of girls smoke at least once a week, although the prevalence varies widely between countries (Inchley et al., 2016). In Finland, 7% of 14–18-year-old boys and 6% of girls of the same age smoked daily in 2019 (Terveyden ja hyvinvoinnin laitos, 2019).

Some research has been conducted on changes in adolescent smoking over time according to socioeconomic status. Richter et al. (2007) observed that the socioeconomic disparities in adolescent smoking remained virtually unchanged in Germany between 1994 and 2002, when family affluence and school type were used to measure SES. Rasmussen et al. (2009) found that socioeconomic differences in adolescent smoking in Denmark fluctuated between 1991 and 2006. In their study, parental occupation was used to measure SES. In addition, a study on the subject was conducted in Finland between 1977 and 2007 (Doku et al., 2010), in which differences in adolescent smoking according to parental education level increased. However, neither parental unemployment nor family structure were taken into account in these studies.

1.3.4 Delinquency

Delinquency refers to criminal behavior committed by a minor (Young et al., 2017). The definition of delinquent behavior in the scientific literature is obscure, and great variation exists across studies on what is considered to constitute delinquent behavior. This is in part due to legislative differences across countries and over time (Young et al., 2017). However, consistent across studies is that delinquency implies conduct that does not conform to the legal or moral standards of society (Quinn et al., 2018; Savioja et al., 2017). Examples of acts that are often considered delinquent include theft, violence, and destruction of property (Young et al., 2017). Delinquency is strongly related to conduct disorder, although not sufficient to diagnose it (World Health Organization, 1992).

Research has identified several risk factors for delinquency. Males are significantly more often involved in delinquent acts than females (Moffitt, 2005). Genetic factors (Moffitt, 2005), lower intellectual ability (Koolhof et al., 2007), and certain personality traits, such as aggressiveness, impulsivity, and antisocial personality (Dam et al., 2005; Meier et al., 2008) increase the risk for committing criminal acts. Delinquent adolescents frequently abuse substances (Mason et al., 2002) and suffer from mental health disorders, especially conduct disorder (Robertson et al., 2004; Sailas et al., 2005; Teplin et al., 2002). Adverse parenting behaviors, such as lack of parental monitoring and support, are also risk factors of delinquency (Hoeve et al., 2009) and parental criminality is related to delinquency in the offspring (Nijhof et al., 2009). Adolescents with traumatic experiences, such as exposure to maltreatment in childhood, are more susceptible to becoming delinquent (Mann et al., 2006; Mersky et al., 2012). Furthermore, disengagement from school, social marginalization, and engaging with delinquent peers are major risk factors for delinquency in adolescence (Haynie et al., 2005; Quinn et al., 2018).

Delinquent adolescents often come from socioeconomically deprived backgrounds. Delinquency is more common among adolescents living in poverty and in disadvantaged neighborhoods (Graif et al., 2014). Low level of parental education (Elonheimo et al., 2009; Sourander et al., 2006) and parental unemployment (Hay et al., 2007; Paternoster et al., 1997) increase the risk for delinquent behavior among adolescents. Living in a nonintact family is likewise positively associated with delinquency (Elonheimo et al., 2009; Elonheimo et al., 2011; Goodnight et al., 2013; Isir et al., 2007; Murray et al., 2010; Sourander et al., 2006).

Delinquency has several harmful effects on the adolescent. It is associated with school dropout (Aizer et al, 2015), substance abuse (Welty et al., 2017), and mental health disorders (Fazel et al., 2008). Delinquency in adolescence also predicts criminality later in life, and the earlier the onset of delinquency, the higher the risk of becoming a life-course persistent offender (Moffitt., 1993). Early interventions and preventive efforts are hence fundamental in decreasing delinquency in the population.

In addition to the consequences for the perpetrator, delinquency has far-reaching impacts on the victims of delinquency. It causes physical, mental, and economic harm to

the victims and impairs perceived safety in the community (Hishinuma et al., 2012; Welsh et al., 2008). Delinquency inflicts significant costs on the public economy through property damage, victims' medical care costs, and the involvement of the police and other public services (Welsh et al., 2008). Preventive efforts targeting the risk factors of delinquency can therefore generate substantial benefits for individuals and society (McCollister et al., 2010).

The prevalence of delinquency among adolescents varies between 6 and 18% in Europe and the US, depending on the measurement (Bjorkenstam et al., 2011; Coker et al., 2014). In Finland, the rate of delinquency is the European average or slightly below (Findikaattori, 2017). According to recent studies, delinquency has decreased in developed countries, including Finland, in past decades (Elonheimo, 2014; Findikaattori, 2017; Grucza et al., 2018; Svensson et al., 2007). Instead, it seems to have become a phenomenon that increasingly concentrates among a small minority of adolescents that commit the majority of delinquent acts in the adolescent population (Elonheimo, 2014). Considering the common risk factors of delinquency, these adolescents are likely to come from socioeconomically disadvantaged backgrounds. However, no studies have so far investigated changes in the prevalence of delinquency over time in different socioeconomic groups.

1.3.5 Cannabis use

Cannabis (marihuana, hashish, hashish oil) is the most commonly used illicit drug in the world, among adults and adolescents (EMCDDA, 2017a; ESPAD Group, 2016). The cannabis plant has two main subspecies, *Cannabis indica* and *Cannabis sativa*, although today most plants are hybrids of the two subspecies (Gloss, 2015). Cannabis can be introduced into the body through multiple routes, including inhalation (smoking, vaporizing) and non-inhalational routes (edibles, drinkables) (Russell et al., 2018). Approximately 16% of European adolescents have tried cannabis at least once in their lifetime, although the prevalence varies widely between countries (ESPAD Group, 2016). In Finland, 8% of adolescents have tried cannabis at least once (ESPAD Group, 2016). Adolescent cannabis use increased in developed countries, including Finland, in the 1990s (Delva et al., 2005; Kohn et al., 2005) but the increase seems to have leveled off in the 21st century (ter Bogt et al., 2014).

The legislation on cannabis has been a subject of worldwide debate over the 21st century (Hopfer, 2014; Jones et al., 2018; Leyton, 2016). In recent decades the international trend in legislation has been to reduce penalties for cannabis-related offences, and an increasing number of countries have decided on decriminalizing or legalizing cannabis use for recreational or medical purposes, or both (EMCDDA, 2017a). Legalization of cannabis entails making its consumption, distribution, ownership, and sales legal, whereas decriminalization denotes only removing or reducing criminal sanctions against the use and the possession of small amounts of cannabis (Svrakic et al., 2012). In Finland, the current cannabis policy rests on total prohibition, where use, possession, manufacturing and selling

are all prohibited (EMCDDA, 2017a). Although the decriminalization of cannabis use and the possession of small amounts of cannabis are currently a subject of heated debate in Finland, the legislation has so far remained fundamentally unchanged (Varjonen et al., 2012). However, the current legislation allows for the charges to be dropped or criminal sanctions to be waived provided that the offence as a whole is minor or the perpetrator has sought medical help for cannabis dependence (Valtakunnansyyttäjänvirasto, 2018). The minority of the perpetrator is also considered a mitigating factor in deciding the degree of penalty (Valtakunnansyyttäjänvirasto, 2018).

The advocates of decriminalization argue that decriminalizing cannabis use and the possession of small amounts of cannabis would make it easier for cannabis abusers to seek help, reduce crime, and free police officers to concentrate on the more severe forms of criminality (Hakkarainen et al., 2017). On the other hand, the opponents fear that decriminalization would increase cannabis use and cannabis-related harms as well as causing a rise in more severe crimes, such as driving under the influence (Hakkarainen et al., 2017). However, scientific knowledge on the long-term effects of the decriminalization or legalization of cannabis on public health is not yet available. In Portugal, where all drug use was decriminalized in 2001, the prevalence of adolescent cannabis use has remained virtually unchanged (EMCDDA, 2017b), whereas the preliminary findings in those states in the US that have legalized cannabis indicate slight increases in cannabis use and cannabis-related harms, such as THC poisonings (Maxwell et al., 2016; Monte et al., 2015). However, predicting the potential consequences of decriminalization in Finland based on results in other countries is unreliable, as the populations, circumstances, and the baseline consumption of cannabis differ between countries.

Cannabis includes over 400 chemical compounds, of which more than 60 are cannabinoids (Atakan, 2012). The most thoroughly studied substances in cannabis are delta-9-tetrahydrocannabinol (THC) and cannabidiol (CBD) (Russo et al., 2017). THC is the main psychoactive cannabinoid in cannabis and therefore responsible for the psychoactive effects of cannabis use (Pacher et al., 2006; Russo et al., 2017). THC has a wide range of effects on the body, including sedation, anxiety, psychotic symptoms, reduced pain and spasticity, and increased appetite (Atakan, 2012; Russo et al., 2017). CBD has several opposite effects to THC on the body (Pacher et al., 2006). CBD possesses antianxiety, antipsychotic, anticonvulsive, anti-emetic, and anti-inflammatory properties (Pacher et al., 2006). It has been shown to counteract several adverse effects of THC (Pacher et al., 2006). In past decades the THC/CBD-ratio in cannabis plants has increased worldwide, which has led to higher cannabis potency and thereby stronger and less predictable effects related to cannabis use (ElSohly et al., 2016).

Although probably not as harmful as some other illicit drugs, cannabis includes several undeniable health hazards. The effects of cannabis use can be divided into acute and long-term effects (Karila et al., 2014). The acute effects occur within minutes to hours of administration and include euphoria, sedation, tachycardia, elevated blood pressure,

intensification of sensory experiences, increased appetite, impaired memory and motor skills, and social withdrawal (Karila et al., 2014). For some people cannabis use can lead to anxiety or acute psychosis (Karila et al., 2014).

When it comes to the long-term effects of cannabis use, most evidence has been presented on the association between cannabis use and mental health disorders. Cannabis use increases the risk for depression, anxiety, and suicidal ideation (Karila et al., 2014). Cannabis use disorder manifests itself as a strong desire to use the substance, increased tolerance, withdrawal symptoms, and continued use despite adverse personal and social consequences (Karila et al., 2014). Cannabis use also increases the risk of using other substances (Degenhardt et al., 2001; Tzilos et al., 2014; Anderson et al., 2014). In addition, cannabis use has been linked to the development of psychotic disorders, especially schizophrenia (Atakan, 2012; Karila et al., 2014). This link has been attributed to the dopaminergic effects of cannabis in the brain (Hall et al., 2008). However, other existing vulnerabilities, such as genetic predispositions, early childhood experiences, and stressful life events contribute largely to the individual risk of developing a psychotic disorder after cannabis use (Atakan, 2012).

Long-term use of cannabis also increases the risk for somatic disorders, including arrhythmias, myocardial infarction, nasopharyngeal cancer, impaired fertility, and adverse birth outcomes (Karila et al., 2014). Long-term cannabis use causes permanent cognitive impairment, especially in the developing brain, thus it is particularly detrimental to the young (Volkow et al., 2014). Cannabis use moreover increases the risk for traffic accidents, school dropout, social marginalization, and criminality later in life (Dugré et al., 2017; Varjonen et al., 2012; Volkow et al., 2014). In addition to individual suffering, drug-related harms cause substantial public expenditures, the majority of these in Finland being on the enforcement of public order and safety, court and prison costs, and social services (Varjonen et al., 2012).

Boys are more likely to use cannabis than girls (Gfroerer et al., 2007). Positive attitudes towards cannabis are associated with heavier use (von Sydow et al., 2002), and cannabis use is more common among adolescents also taking other substances (Hayatbakhsh et al., 2009). Other problem behaviors, mental health problems, and social marginalization increase the risk of cannabis use in adolescence (Hayatbakhsh et al., 2009; Kedzior et al., 2014).

Social environment plays a central role in adolescent cannabis use. Lack of parental monitoring, permissive parental attitudes towards cannabis use as well as parental substance use and mental health problems increase the risk for adolescent to experiment with cannabis (Melchior et al., 2011; von Sydow et al., 2002). Peer influences, such as cannabis use in the peer group and positive attitudes towards the substance among peers, make the adolescent more prone to using cannabis (Von Sydow et al., 2002). Also the availability of cannabis contributes to its use (von Sydow et al., 2002).

As with other problem behaviors, the risk of adolescent cannabis use is associated with socioeconomic status. Parental unemployment increases the risk for cannabis use among adolescents (Legleye et al., 2012) and cannabis use is more common among adolescents living in nonintact families (Delva et al., 2005; Swift et al., 2008). Findings on the association between parental education and adolescent cannabis use are mixed: some studies have found low parental education to increase the risk for adolescent cannabis use (Delva et al., 2005, Willis et al., 1995), whereas others have observed a positive association between high parental education and adolescent cannabis use (Charitonidi et al., 2016; Gripe et al., 2017; Patrick et al., 2012). No studies have investigated changes in adolescent cannabis use over time in different socioeconomic groups.

1.4 Summary of the literature

Adolescence is a time of dramatic changes, and also a risky period for engaging in problem behaviors. On the one hand, normative changes, such as brain maturation, identity formation, and increased peer influence, predispose adolescents to experimenting, risk-taking, and pleasure-seeking behaviors. On the other hand, struggling to adapt to several physical, psychological, and social changes can lead to the engagement in problem behaviors.

In addition to the normative changes in adolescence, low socioeconomic status is a significant risk factor of adolescent problem behaviors. There is no universal way to measure socioeconomic status in adolescence, which is why several coexisting measures have been used in the scientific literature. These measures include but are not limited to level of parental education, parental unemployment, and family structure. All three measures have been associated with adolescent problem behaviors, most strongly parental unemployment and low level of parental education, whereas the association between family structure and adolescent problem behaviors is less pronounced but consistent.

Adolescent problem behaviors inflict significant harm on individual and public health. Bullying at school is one of the biggest health threats among adolescents, having long-lasting impacts on the health and well-being of the victims. Tobacco smoking is the leading preventable cause of death worldwide, and it is most often started in adolescence. Delinquency inflicts significant costs on individuals and society, and it is also associated with criminality later in life. Cannabis use in adolescence is associated with severe health risks, including increased risk for mental health disorders and social marginalization. Therefore, adolescence marks a critical time frame for the prevention and treatment of problem behaviors with potential long-lasting effects on later life.

According to time trend studies, no significant changes or even slightly favorable changes have occurred in the prevalences of adolescent problem behaviors in developed countries since the beginning of the millennium. The prevalence of adolescent cannabis use does not seem to have changed markedly in recent decades, whereas the prevalences of adolescent smoking, delinquency, and bullying at school have decreased.

Although the prevalences of adolescent problem behaviors have declined in recent decades at the population level, it is not known whether the positive trends can be observed in all socioeconomic groups. Increased socioeconomic disparities have been reported in several areas of adolescent health and well-being in Finland and other developed countries. In Europe and the US, socioeconomic disparities increased over time in adolescent obesity, physical activity, and physical and psychological symptoms. In Finland, increased socioeconomic disparities have been observed in adolescent self-rated depression, alcohol consumption, and smoking. It is therefore possible that socioeconomic disparities in adolescent problem behaviors have increased in Finland. However, scientific data on the subject are scarce.

2 Aims of the study

The research questions of this study were formulated as follows:

1. Are the problem behaviors (bullying at school, cannabis use, smoking, and delinquency) associated with socioeconomic adversities among Finnish adolescents?
2. Were there changes in the prevalences of problem behaviors among Finnish adolescents between 2000 and 2015?
3. Did the differences in problem behaviors between socioeconomic groups increase or decrease among Finnish adolescents between 2000 and 2015?

3 Method

3.1 Data and participants

The data for this study were obtained from the School Health Promotion Study (SHPS) commissioned by the National Institute for Health and Welfare (Terveyden ja hyvinvoinnin laitos, THL). The SHPS is a nationally conducted anonymous classroom survey on the well-being, health, and school experiences of Finnish adolescents. The survey has been conducted nationwide biennially with pooled 2-year data since 1996 among all Finnish 8th and 9th graders (14–16-year-olds). The data were collected anonymously during school lessons under the supervision of teachers, who did not interfere with the responses. Participants were informed about the voluntary nature of the study in both oral and written form, and returning the survey was taken to be consent to participate. The survey took about 30–45 minutes to complete. After this, the surveys were put into envelopes, sealed, and returned directly to the research center.

This study comprises the responses of the 8th and 9th graders to surveys from 2000 to 2015. Altogether, 761,278 (50,404–109,127 biennially) adolescents participated in the surveys during this time period. The biennial cohorts covered between 74–84% of the whole age cohort of Finland. The timing of the study, sampling, and data collection methods were held constant over the study period. This study was approved by the ethics committee of the Pirkanmaa Hospital District and the National Institute of Health and Welfare.

3.2 Measures

Socioeconomic adversities

The socioeconomic variables studied were family structure, parental education, and parental unemployment in the past year.

Parental education was elicited as follows: 'What is the highest education qualification your father/mother has achieved?' In the 2000–2001 questionnaire, the response options were 'basic school/vocational school/high school or high school and vocational school/university or polytechnic'. The response options varied slightly across questionnaires. In addition, a response option 'no education' appeared in the 2013 questionnaire but was subsequently removed from the 2015 questionnaire. For the analyses, parental education was dichotomized to both parents with basic education only (including the response option 'no education', as basic education is compulsory in Finland) versus at least one parent with more than basic education.

Parental unemployment was elicited as follows: 'Have your parents been unemployed or laid off work during the past YEAR?' The response options were 'neither parent/one parent/both parents', and remained the same through all questionnaires. The original categorization was preserved in the analyses.

Family structure was elicited as follows: 'My family consists of...' The response options in the 2000–2001 questionnaire were 'mother and father/mother and stepfather/father and stepmother/mother only/father only/spouse/other caregiver'. The number of response options increased over time, so that in the 2014–2015 questionnaire the response options were 'mother and father/mother and father by turns, they do not live together/only father/only mother/mother or father and their partner/foster family/other caregiver/child welfare institution/other adult or adults/other'. However, living with mother and father was always included as the first option. Due to variation in response alternatives over time, family structure was dichotomized for the analyses as living with mother and father versus other family structure.

A composite variable 'cumulative socioeconomic adversity' was created out of the three socioeconomic variables. In this variable, parental education was scored as follows: 0 = at least one parent with higher than basic education, 1 = both parents with basic education only. Parental unemployment was scored in the following way: 0 = both parents employed, 1 = one parent unemployed, 2 = both parents unemployed. The dichotomized values for family structure were: 0 = living with mother and father, 1 = not living with mother and father. Therefore, the sum score of 0 stood for having none of the socioeconomic adversities studied, and the sum score of 4 stood for the maximum number of socioeconomic adversities studied.

Bullying at school

Before the elicitation of involvement in bullying, there was a brief definition of bullying in the questionnaire: 'In this questionnaire, bullying refers to the harassment of one pupil by another pupil or a group of pupils either verbally or physically. Tormenting a pupil repeatedly in ways he or she does not like is also considered bullying. An argument between two roughly equal pupils is not considered bullying.' After the definition, bullying and being bullied were elicited using two questions from a study on youth health by the World Health Organization (King et al., 1996): 'How often have you been bullied at school in this SEMESTER?' and 'How often have you participated in bullying other students in this SEMESTER?' The response options to both questions were 'several times a week/ about once a week/less frequently/not at all'. These questions have been shown to possess good validity and reliability for measuring involvement in bullying (Roberson et al., 2018). For the analyses, two dichotomized variables 'frequently bullying others' and 'frequently bullied' were created, in which the response alternatives 'several times a week' and 'about once a week' were considered frequent involvement in bullying.

Smoking

Smoking was elicited with two questions. The first question measured lifelong smoking: 'How many cigarettes, pipefuls and cigars have you smoked altogether?' The response options were: 'none/only one/about 2–50/50 or more'. Those reporting other than 'none' were advised to answer a question regarding current smoking: 'Which of the following options best describes your CURRENT SMOKING?' The response options were: 'I smoke once a day or more often/I smoke once a week or more often but not daily/I smoke less often than once a week/I have quit smoking'. Out of these questions, two dichotomous variables were created: 'frequent smoking', in which smoking at least once a week was regarded as frequent smoking, and 'lifelong nonsmoking', which was dichotomized as having never tried smoking versus having tried smoking at least once in one's lifetime.

Delinquency

The questions eliciting delinquent behavior were adapted from the Finnish Self-Report Delinquency Study questionnaire (Salmi et al., 2015), which is a modified version of the International Self-Report Delinquency Study (ISRD) instrument (Junger-Tas et al., 1994). The ISRD instrument has been shown to possess good reliability for measuring delinquency (Zhang et al., 2000). Delinquent behavior was elicited with five questions: 'During the past 12 months have you 1) drawn tags or graffiti on walls or elsewhere, 2) deliberately damaged or destroyed school property or the school building, 3) deliberately damaged or destroyed other property, 4) stolen from a shop or a stall, 5) beaten someone up?' Response options to all questions were no (=0) / once (=1) / 2–4 times (=2) / more than 4 times (=3). The formulation of the five questions remained constant between 2000 and 2015. A sum score

was formed of the five questions, ranging between 0 and 15. The score was dichotomized with a value of 4 or more (representing the 90th percentile) indicating delinquency. The 90th percentile was chosen for a cutoff point instead of a certain number of delinquent acts as the percentile takes into account the international variation in the prevalences of delinquency and is therefore more suitable for the estimation of delinquency in a certain population (Young et al., 2017).

Cannabis use

Lifetime substance use was elicited as follows: 'Have you ever tried or used the following substances? Please answer every item.' Below followed a list of various substances, including 'marijuana or hashish'. This formulation was held constant throughout the questionnaires, apart from a slightly more specified version in the 2015 questionnaire: 'marijuana or hashish (cannabis)'. The response options were: 'never/once/2–4 times/5 times or more often'. For the analyses, two dichotomous variables – 'any cannabis use' (at least once vs. never) and 'frequent cannabis use' (at least 5 times vs. other) – were created. The cutoff point of five or more times of cannabis use was based on the findings by Zoccolillo et al. (1999), which demonstrated that such frequency indicates problematic use in this age group.

3.3 Statistical analyses

Statistical analyses were conducted using SPSS software (version 24).

Distributions for socioeconomic adversities and prevalences of problem behaviors over time were calculated using crosstabs and the Chi-square test. The proportions of problem behaviors were calculated both in the whole sample and according to cumulative socioeconomic adversity.

Bivariate associations were studied using binomial logistic regression with the results shown as odds ratios (OR) with 95% confidence intervals (CI). In all models, the problem behavior studied was entered as a dependent variable.

In the first model, bivariate associations between problem behaviors and time were studied. The categorical time period (2000–2001, 2002–2003, 2004–2005, 2006–2007, 2008–2009, 2010–2011, 2012–2013, 2014–2015) was entered as an independent factor using the time period 2000–2001 as a reference category.

In the second model, bivariate associations between problem behaviors and socioeconomic adversities were studied. Each of the socioeconomic adversities and cumulative socioeconomic adversity were entered as independent factors one at a time. The following reference categories were used: parental education: at least one parent with higher than basic education; parental unemployment in the past year: neither parent unemployed in the past year; family structure: living with both parents; and cumulative socioeconomic adversity: no cumulative socioeconomic adversity (a score of 0).

In the third model, bivariate associations between problem behaviors and cumulative socioeconomic adversity were studied in different time periods. Cumulative socioeconomic adversity was entered as an independent factor using no cumulative socioeconomic adversity (a score of 0) as a reference category. Bivariate associations were calculated separately for each time point.

4 Results

4.1 Socioeconomic adversities

Of boys 5.6% and of girls 5.9% had parents with basic education only, and 23.3% of boys and 25.1% of girls were not living with both parents. Of girls 23.6% and of boys 25.6% had had one parent unemployed or laid off in the past year, and both parents had been unemployed or laid off in the past year among 3.2% of boys and 3.3% of girls. The prevalences of low level of parental education and parental unemployment fluctuated slightly over time, whereas the prevalence of adolescents not living with both parents increased over the study period (Publication I, Table 3).

4.2 Bullying at school

Of boys 8.6% and of girls 5.9% had frequently been subjected to bullying during the ongoing semester. Correspondingly, 9.4% of boys and 2.8% of girls reported having frequently bullied others during the ongoing semester. Compared to the 2000–2001 level, there were no significant differences over time in the odds ratios for either bullying victimization or bullying perpetration (Publication I, Table 2).

Being frequently bullied and frequently bullying others were both positively associated with socioeconomic adversities. The odds ratio for frequent bullying victimization for boys was 1.3 (95% CI 1.3–1.3) if one parent was unemployed, and 2.8 (95% CI 2.7–3.0) if both parents were unemployed. The corresponding odds ratios for girls were 1.4 (95% CI 1.4–1.5) and 2.6 (95% CI 2.4–2.7). The odds ratio for frequent bullying perpetration for boys was 1.3 (95% CI 1.2–1.3) if one parent was unemployed, and 3.1 (95% CI 2.9–3.2) if both parents were unemployed. The corresponding odds ratios for girls were 1.4 (95 % OR 1.3–1.5) and 3.4 (95% CI 3.2–3.7). Low parental education likewise increased the risk for

frequent bullying victimization (OR for boys and girls 1.6 (95% CI 1.5–1.7)) and frequent bullying perpetration (OR for boys 1.7 (95% CI 1.6–1.8), OR for girls 1.8 (95% CI 1.7–2.0)). Not living with both parents was also associated with an increased risk for frequent victimization (OR for boys 1.4 (95% CI 1.3–1.4), OR for girls 1.5 (95% CI 1.4–1.5)) and perpetration (OR for boys 1.5 (95% CI 1.5–1.6), OR for girls 1.7 (95% CI 1.7–1.8)).

No significant changes were observed over time in the prevalence of frequent bullying victimization or perpetration among adolescents who scored 0–3 on cumulative socioeconomic adversity. Instead, among adolescents with most cumulative socioeconomic adversity the prevalence of frequent bullying victimization increased among boys from 36% to 47% and among girls from 15% to 44% between 2000 and 2015. Correspondingly, the prevalence of frequent bullying perpetration increased among boys with most socioeconomic adversities from 36% to 54% and among girls with most socioeconomic adversities from 15% to 36% over the study period. When using adolescents with no socioeconomic adversities as a reference group, the odds ratio for frequently bullying others among boys with most socioeconomic adversities was 6.3 (95% CI 4.2–9.2) in 2000–2001 and 27.6 (95% CI 20.5–37.2) in 2014–2015 (Figure 1). The corresponding odds ratios for girls were 8.6 (95% CI 4.7–15.6) and 76.6 (95% CI 47.2–124.4) (Figure 2). The odds ratio for frequently being bullied among boys with most socioeconomic adversities was 7.6 (95% CI 5.2–11.3) in 2000–2001 and 18.1 (95% CI 13.5–24.3) in 2014–2015 (Figure 3). The corresponding odds ratios for girls were 4.1 (95% CI 2.3–7.5) and 19.3 (95% CI 12.6–29.5) (Figure 4).

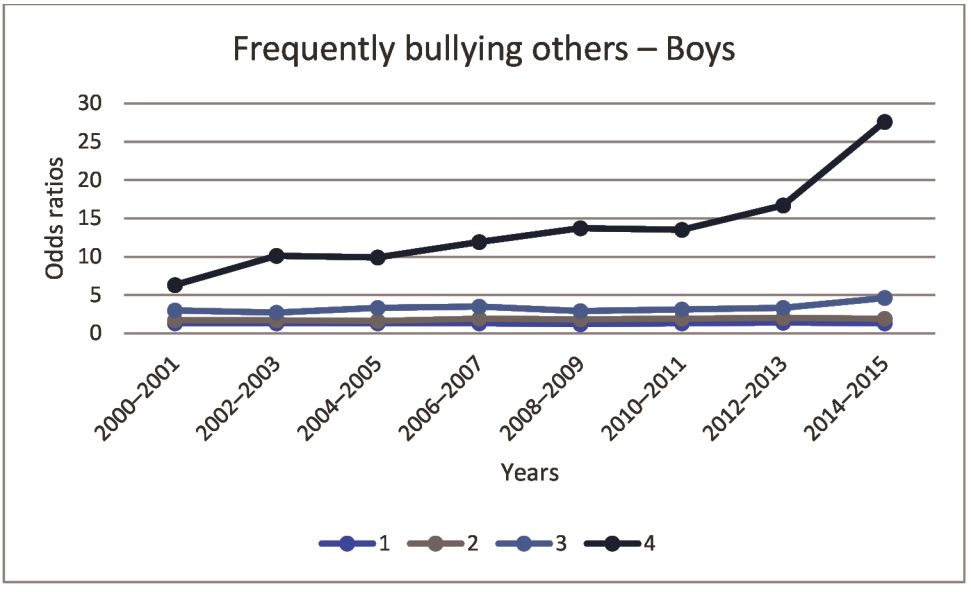

Figure 1

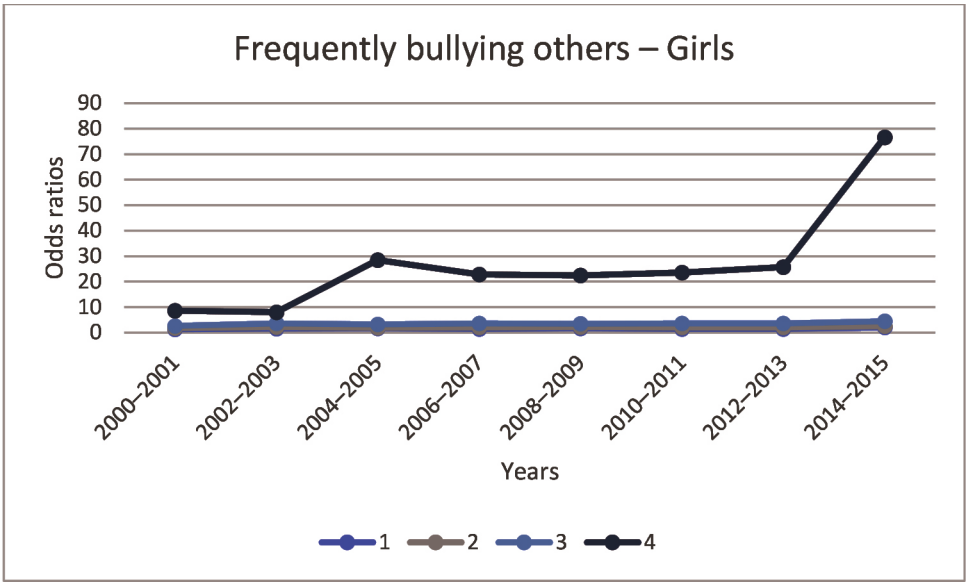

Figure 2

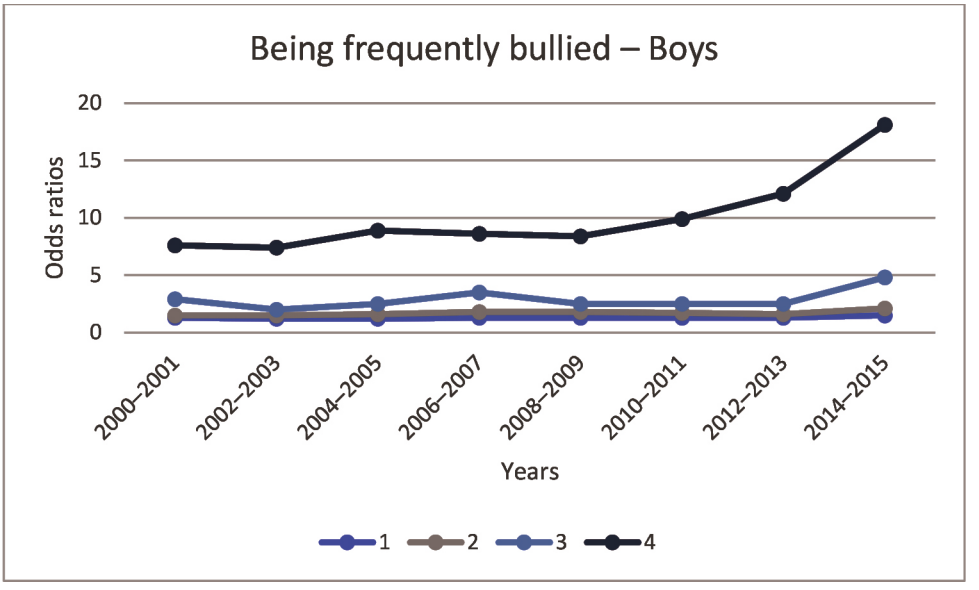

Figure 3

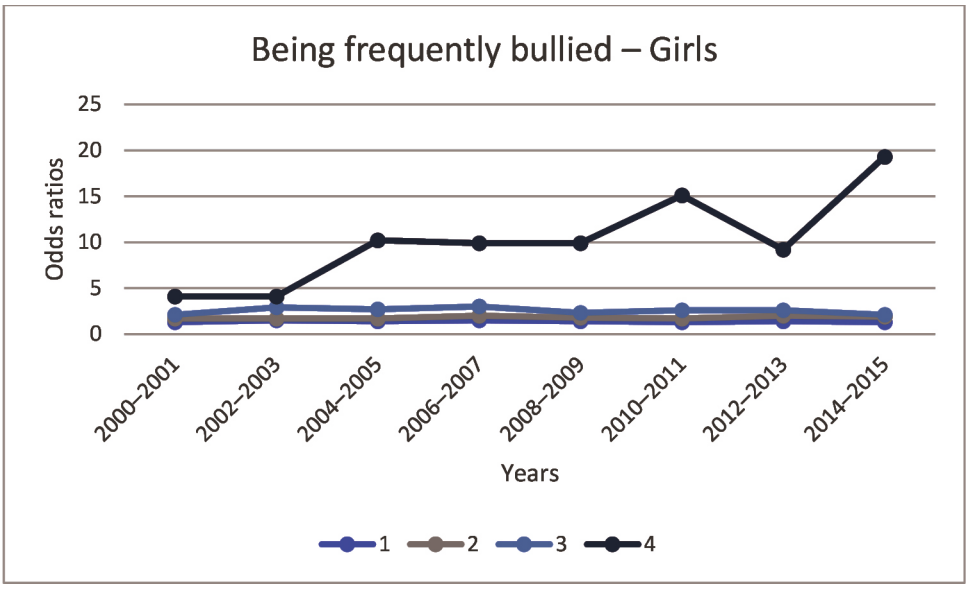

Figure 4

4.3 Smoking

Of boys 21.7% and of girls 20.0% reported smoking frequently, and 53.6% of boys and 55.5% of girls had never tried smoking in their lifetime. The odds ratios for frequent smoking decreased over time among both sexes, whereas the odds ratios for lifelong nonsmoking showed an increase over time among both sexes (Publication II, Table 2).

Socioeconomic adversities were positively associated with frequent smoking and negatively associated with lifelong nonsmoking among both sexes. Not living with both parents increased the likelihood of frequent smoking twofold (OR for boys 2.1 (95% CI 2.0–2.1), OR for girls 2.2 (95% CI 2.1–2.2)) and decreased the likelihood of lifelong nonsmoking by half (OR for boys 0.6 (95% CI 0.6–0.6), OR for girls 0.5 (95% CI 0.5–0.5)) compared to adolescents living with both parents. Similarly, low parental education increased the likelihood of frequent smoking (OR for boys 1.7 (95% CI 1.6–1.7), OR for girls 1.6 (95% CI 1.5–1.6)) and decreased the likelihood of lifelong nonsmoking (OR for boys 0.7 (95% CI 0.7–0.7), OR for girls 0.7 (95% CI 0.7–0.8)). When one parent was unemployed, the OR for frequent smoking for boys was 1.4 (95% CI 1.4–1.5) and for girls 1.5 (95% CI 1.5–1.6), and the OR for lifelong nonsmoking for boys was 0.8 (95% CI 0.8–0.8) and for girls 0.6 (95% CI 0.5–0.6). When both parents were unemployed, the corresponding OR for frequent smoking for boys was 2.6 (95% CI 2.5–2.7) and for girls 2.3 (95% CI 2.2–2.4), and the OR for lifelong nonsmoking for boys was 0.5 (95% CI 0.5–0.5) and for girls 0.6 (95% CI 0.5–0.6).

The more socioeconomic adversities accumulated, the more likely the adolescents were to smoke frequently and the less likely they were never to have tried smoking (Figures 5–8). The prevalence of frequent smoking decreased among adolescents who scored 0–3 on cumulative socioeconomic adversity, but no similar change was observed among adolescents scoring highest in cumulative socioeconomic adversity (Publication II, Table 4). Similarly, the prevalence of lifelong nonsmoking increased among adolescents who scored 0–3 on cumulative socioeconomic adversity, but no change was observed among adolescents who scored 4 on cumulative socioeconomic adversity (Publication II, Table 4). When using adolescents with no socioeconomic adversities as a reference group, the odds ratio for frequent smoking among boys with most socioeconomic adversities increased from 6.7 (95% CI 4.4–10.0) to 22.8 (95% CI 16.6–31.4) between 2000 and 2015 (Figure 5). Similarly, the odds ratio for frequent smoking among girls with most socioeconomic adversities increased from 3.9 (95% CI 2.5–6.0) to 19.2 (95% CI 12.6–29.4) over the study period (Figure 6). The odds ratios for lifelong nonsmoking decreased over time among adolescents with most socioeconomic adversities (Figures 7 and 8).

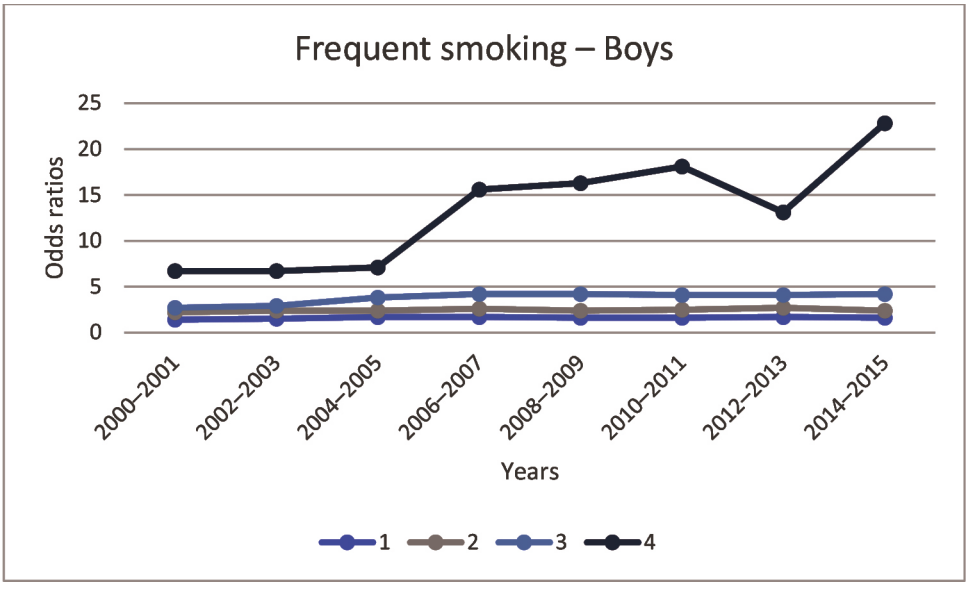

Figure 5

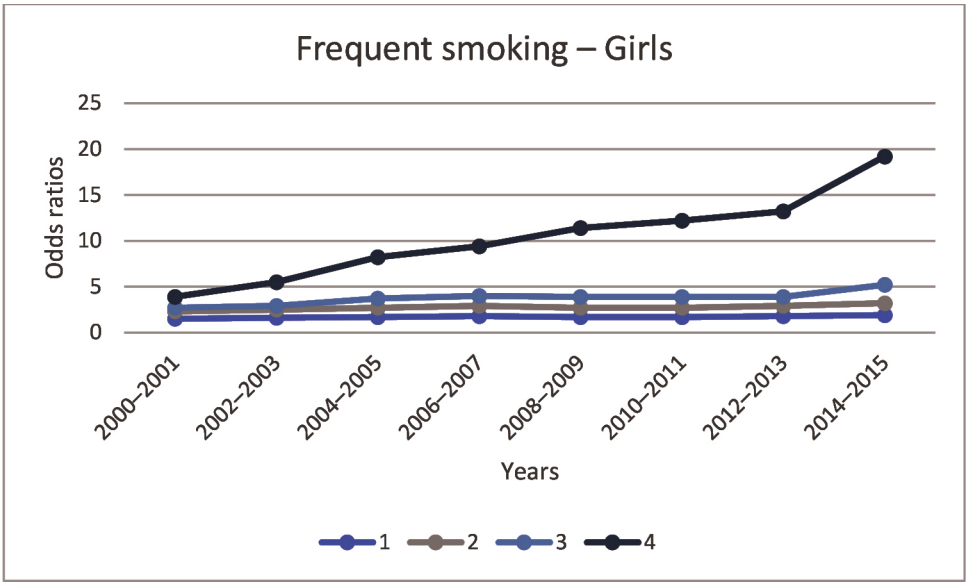

Figure 6

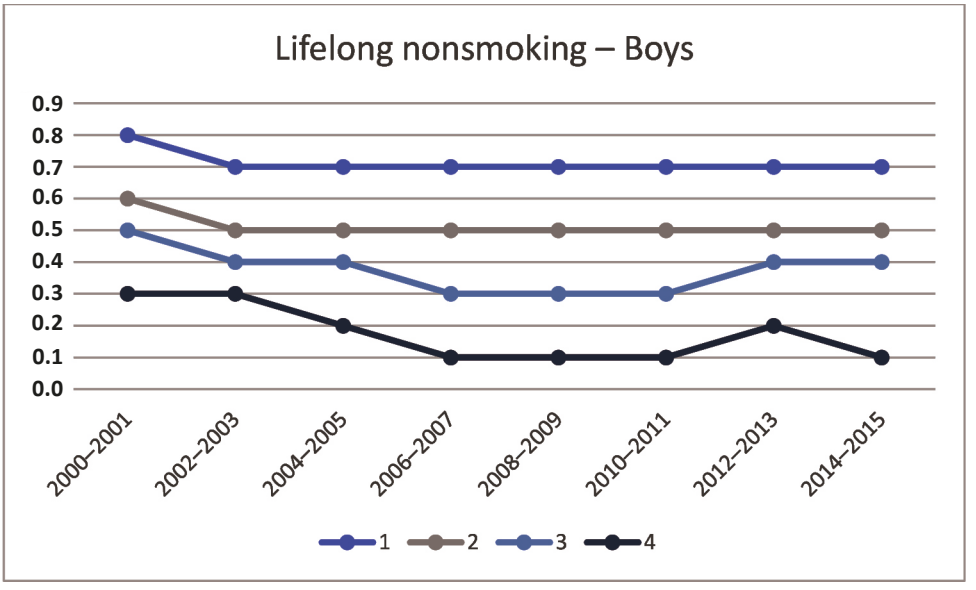

Figure 7

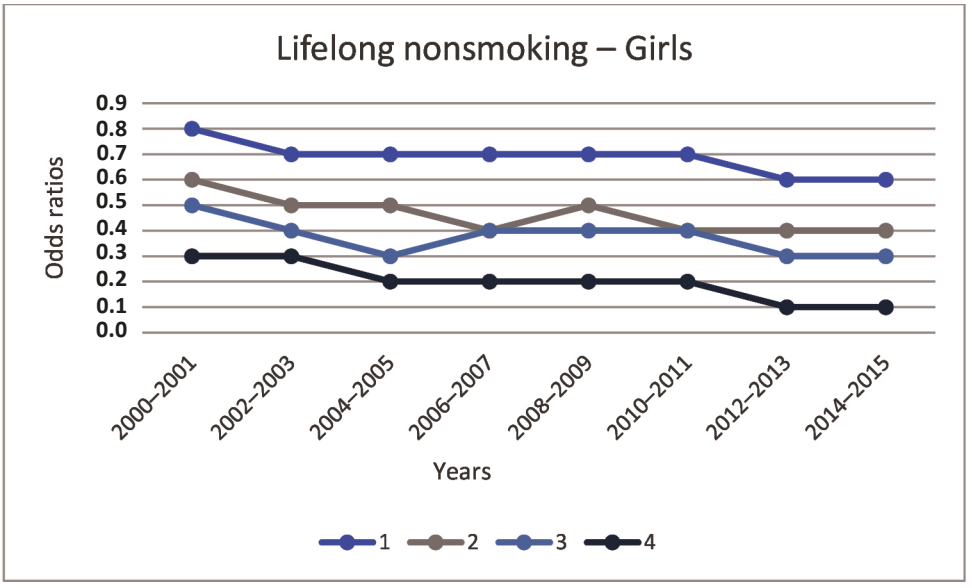

Figure 8

4.4 Delinquency

Overall, 11.0% of boys and 6.4% of girls scored to the 90th percentile on delinquent behavior. Compared to the 2000–2001 level, the odds ratios for delinquency decreased slightly over time among both sexes (Publication III, Table 2).

Delinquency was positively associated with low level of parental education, parental unemployment and not living with both parents. If one parent was unemployed, the odds ratio for delinquency for boys was 1.5 (95% CI 1.5–1.5) and for girls 1.6 (95% CI 1.6–1.7). If both parents were unemployed, the odds ratio for delinquency for boys was 3.9 (95% CI 3.8–4.1) and for girls 3.2 (95% CI 3.0–3.4). Low level of parental education increased the odds ratio for delinquency among boys to 1.7 (95% CI 1.6–1.8) and among girls to 1.5 (95% CI 1.4–1.6). If the adolescent was not living with both parents, the odds ratio for delinquency was 1.9 among boys (95% CI 1.9–1.9) and girls (95% CI 1.8–1.9).

The prevalence of delinquency showed no significant change over time among girls and boys who scored 0–3 on cumulative socioeconomic adversity, whereas it increased among adolescents with most socioeconomic adversities (Publication III, Table 4). When using adolescents with no socioeconomic adversities as a reference group, the odds ratio for delinquency among boys with most socioeconomic adversities increased from 6.6 (95% CI 4.3–10.0) in 2000–2001 to 50.5 (95% CI 35.9–71.0) in 2014–2015 (Figure 9). The corresponding odds ratios for girls with most socioeconomic adversities were 5.3 (95% CI 3.0–9.2) in 2000–2001 and 40.8 (95% CI 26.5–62.7) in 2014–2015 (Figure 10).

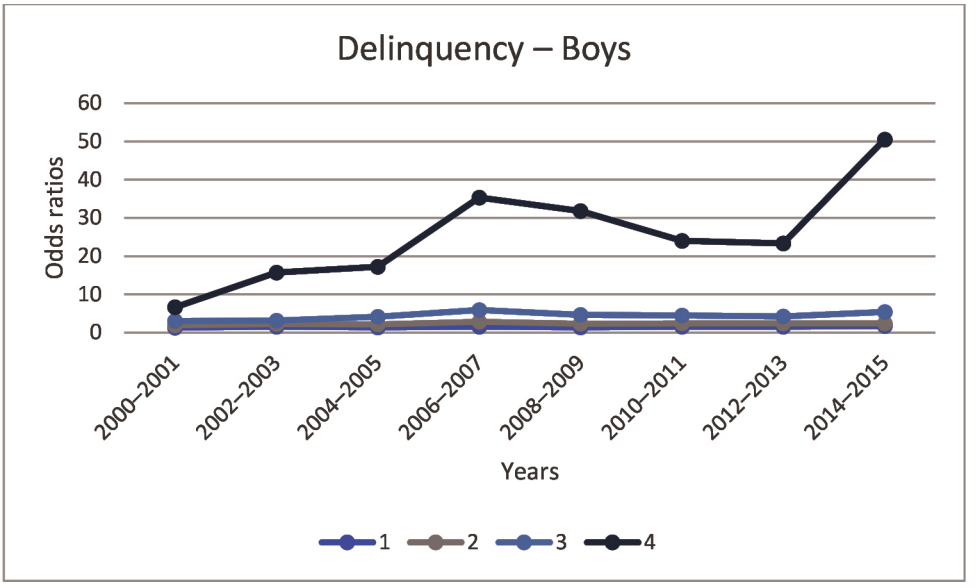

Figure 9

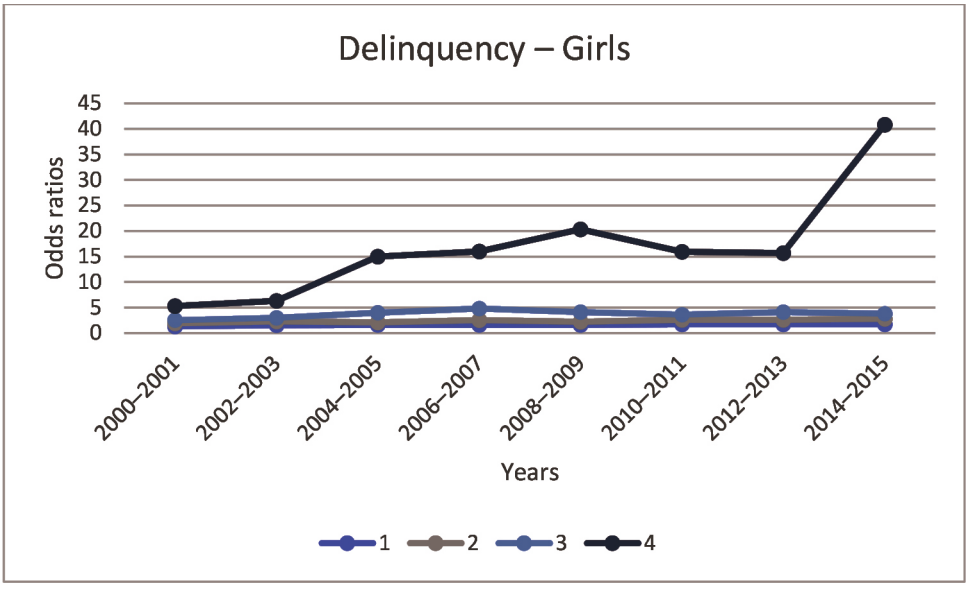

Figure 10

4.5 Cannabis use

Of boys 8.1% and of girls 6.0% reported having used cannabis at least once in their lifetime. Correspondingly, 2.9% of boys and 1.5% of girls reported having used cannabis five times or more often in their lifetime. The odds ratios for any and frequent cannabis use varied only slightly over time among both sexes (Publication IV, Table 3).

Any and frequent cannabis use were positively associated with all three socioeconomic adversities studied. If one parent was unemployed, the odds ratio for any cannabis use among boys was 1.5 (95% CI 1.4–1.5) and among girls 1.6 (95% CI 1.5–1.6). The corresponding odds ratios for frequent cannabis use were 1.4 (95% CI 1.3–1.5) for boys and 1.7 (95% CI 1.6–1.8) for girls. If both parents were unemployed, the odds ratio for any cannabis use among boys was 4.6 (95% CI 4.4–4.8) and among girls 3.1 (95% CI 2.9–3.2). The corresponding odds ratios for frequent cannabis use were 8.4 (95% CI 7.9–8.8) for boys and 6.1 (95% CI 5.6–6.6) for girls. Not living with both parents increased the odds ratio for any cannabis use among boys to 2.7 (95% CI 2.6–2.7) and among girls to 2.8 (95% CI 2.7–2.8), and the odds ratio for frequent cannabis use to 3.1 (95% CI 3.0–3.3) among boys and to 3.7 (95% CI 3.5–3.9) among girls. Among adolescents with low parental education, the odds ratio for any cannabis use for boys was 1.9 (95% CI 1.8–2.0) and for girls 1.5 (95% CI 1.4–1.5). The corresponding odds ratios for frequent cannabis use were 3.2 (95% CI 3.1–3.4) for boys and 2.6 (95% CI 2.4–2.8) for girls.

The prevalences of any and frequent cannabis use varied only slightly over time among adolescents with least cumulative socioeconomic adversity (Publication IV, Table 5). Instead, among adolescents who scored 4 on cumulative socioeconomic adversity, the prevalence of any cannabis use increased among boys from 46.8% to 75.8%, and among girls from 22.4% to 53.3% over the study period. Similarly, among adolescents with most socioeconomic adversities the prevalence of frequent cannabis use increased among boys from 35.8% to 71.1%, and among girls from 8.2% to 43.5% over the study period. When using adolescents with no socioeconomic adversities as a reference group, the odds ratio for any cannabis use increased among boys with most socioeconomic adversities from 12.0 (95% CI 8.2–17.6) in 2000–2001 to 51.4 (95% CI 36.6–72.0) in 2014–2015, and correspondingly among girls from 4.6 (95% CI 2.8–7.7) to 36.6 (95% CI 23.9–55.9) (Figures 11 and 12). The odds ratios for frequent cannabis use increased among boys with most socioeconomic adversities from 29.5 (95% CI 19.7–44.2) to 107.3 (95% CI 76.8–150.0) and among girls from 7.9 (95% CI 3.6–17.4) to 101.9 (95% CI 64.1–162.3) over the study period (Figures 13 and 14).

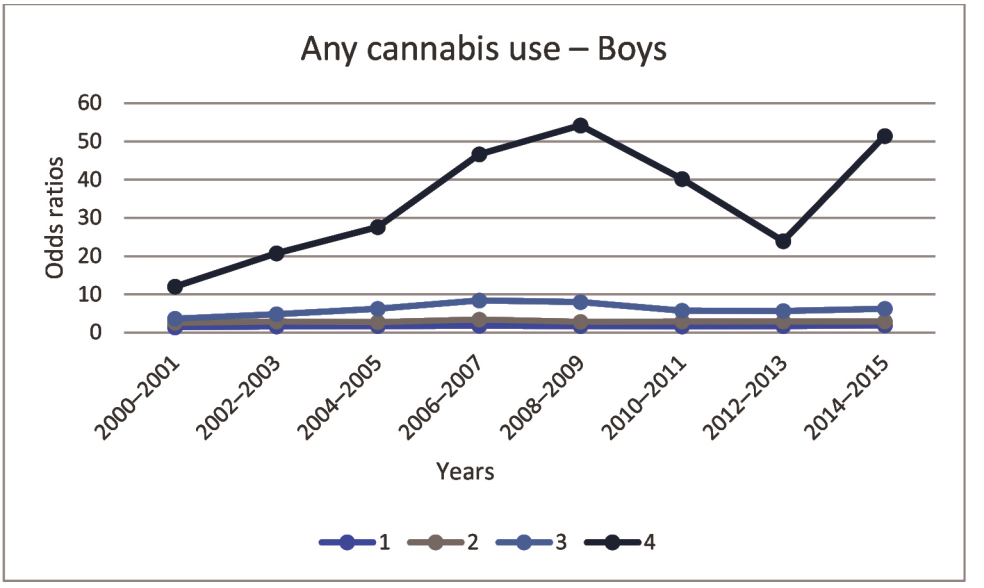

Figure 11

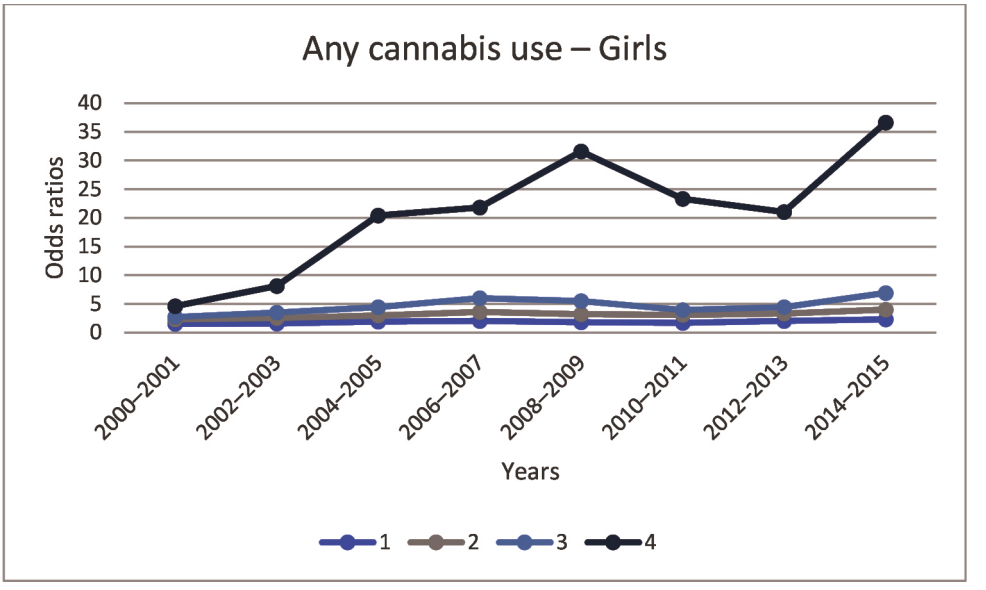

Figure 12

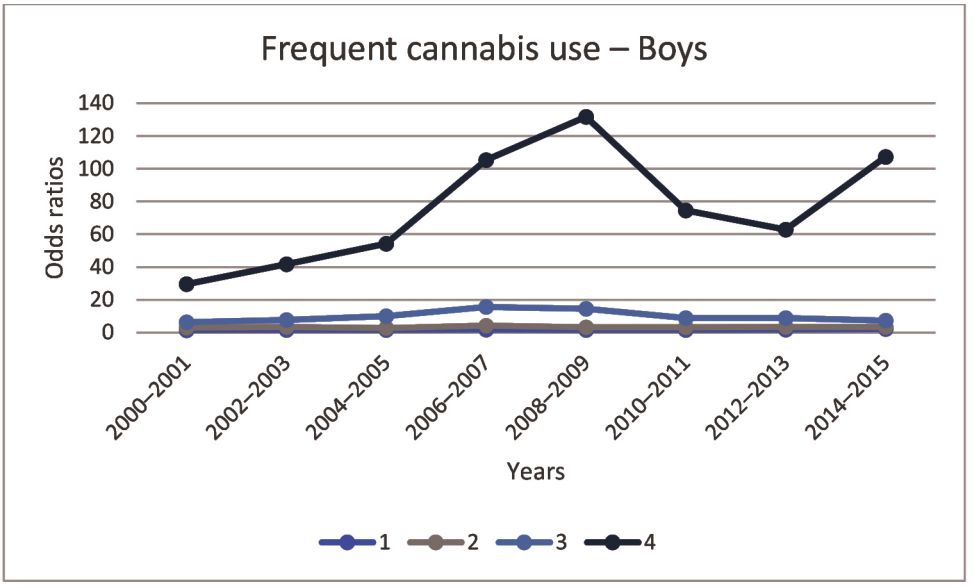

Figure 13

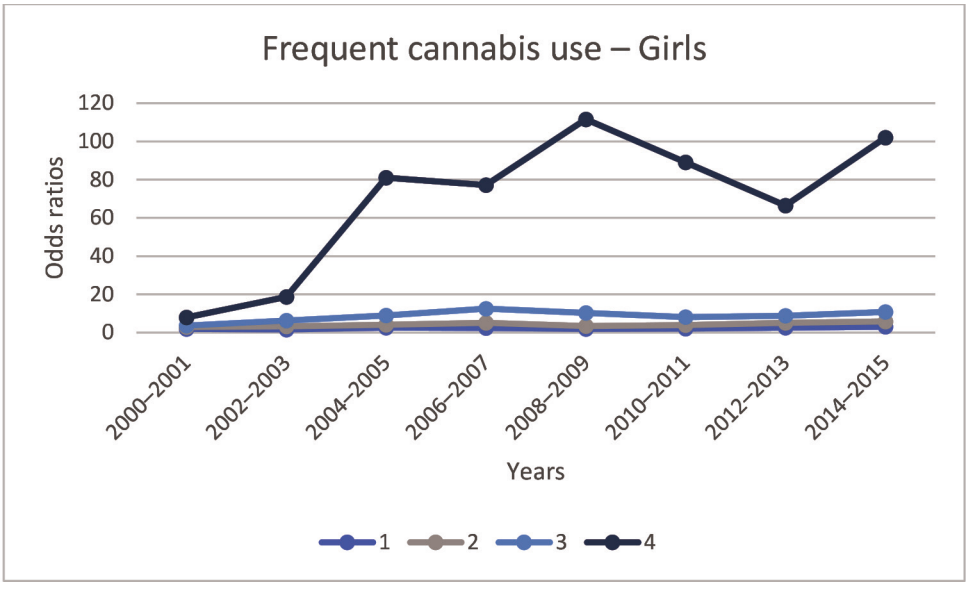

Figure 14

5 Discussion

5.1 Bullying at school

Both bullying and being bullied were associated with the socioeconomic adversities studied: low level of parental education, not living with both parents, and parental unemployment in the past year. The findings are in accordance with those of earlier studies (Aho et al., 2016; Fu et al., 2013; Jablonska et al., 2007; Jansen et al., 2011; Jansen et al., 2012; Magklara et al., 2012; de Oliveira et al., 2015).

All the socioeconomic adversities studied are associated with poor financial situation in the family (Amato et al., 1991, Galobardes et al, 2006a, Galobardes et al, 2006b). Adolescents from socioeconomically deprived backgrounds might stand out by not having the same brand of clothes and electronic devices as their peers, and therefore be more easily chosen as targets of bullying. The higher prevalence of mental health problems among low-SES adolescents might also mediate the link between SES and bullying victimization (Elgar et al., 2015). When it comes to being bullied, the possibility of a reverse causality needs to be considered. Self-reported depression is more common among low-SES adolescents (Torikka et al., 2014), and people with depression are known to interpret their environment more negatively than others (Kaltiala-Heino et al., 2011). Thus, low-SES adolescents may interpret their peers' actions more negatively than others and therefore experience more bullying than others.

Financial problems in the family are also risk factors of bullying perpetration (Caravaca Sánchez et al., 2016). Perpetrators from low-SES backgrounds may use bullying as a strategy to gain higher social status among peers (Wolke et al., 2015). In addition, low socioeconomic status is associated with less parental monitoring, which increases the likelihood of bullying others (Shetgiri, 2012). The higher prevalence of conduct disorder and other mental health problems among low-SES adolescents may likewise explain the results (Luukkonen et al., 2010).

5.2 Smoking

Smoking was associated with socioeconomic adversities, which is in line with earlier studies (Du et al., 2015; Kuntz et al., 2016; Ledoux et al., 2002; Moberg et al., 2001). Low SES is associated with a higher likelihood of smoking initiation and a lower likelihood of successful smoking cessation (Hiscock et al., 2012). Parents with low level of education are more likely to smoke and parental smoking is a substantial risk factor of adolescent smoking. As the parents of low-SES adolescents are more likely to smoke, these adolescents may get less social support from their social environment for their attempts to stop smoking (Hiscock et al., 2012). In addition, psychiatric morbidity is more prevalent in low-SES groups and adolescents with mental health problems are more likely to smoke (Audrain-McGovern et al., 2009).

According to Willis (1977), adolescents from working-class backgrounds can see "the working class lifestyle" as a way of contributing to and substantiating a certain view of life. For these adolescents, the reason for not pursuing higher education and white-collar jobs is not the lack of cognitive capacity or necessarily even economic obstacles, but rather a lack of motivation. They may not feel the need to pursue an academic career path and may even find it undesirable. Some adolescents from low socioeconomic backgrounds may thus perceive behaviors that are common among these groups, such as smoking, as a positive reinforcement of their working-class identities.

5.3 Delinquency

The association between delinquency and socioeconomic adversities has been observed in earlier studies (Hay et al., 2007; Paternoster et al., 1997; Sourander et al., 2006). Living in poverty, especially long-term poverty, is a well-known risk factor of delinquency (Agnew et al., 2008). Poverty is linked to a lack of resources and opportunities available to young people in multiple domains of life (Kingston, 2015). Socioeconomically deprived adolescents are less likely to be committed to school and more likely to drift into peer groups that engage in delinquent behavior (Ferguson et al., 2007; Moss et al., 2003).

Parental monitoring is a substantial protective factor against problem behaviors among adolescents, and less parental monitoring in low-SES families may put these adolescents at risk for engaging in delinquent acts (Dick et al., 2007; Hartinger-Saunders et al., 2012; Jones et al., 2015). The higher prevalence of substance use and mental health problems among low-SES adolescents may for its part contribute to the link between low SES and delinquency (Park et al., 2013, Melchior et al, 2011). Adolescents with certain mental health disorders, such as conduct disorder, are more prone to aggressive and delinquent behaviors, and mental health problems are indeed rather common among delinquents (Underwood et al., 2016).

5.4 Cannabis use

As with other probem behaviors, the association between socioeconomic adversities and adolescent cannabis use has been observed in earlier studies (Delva et al., 2005; Swift et al., 2008; Widome et al., 2013). Parents with low socioeconomic status are more likely to use substances and suffer from mental health problems, which are risk factors of adolescent substance use (Artazcoz et al., 2004; Weitoft et al., 2008). On the other hand, socioeconomically disadvantaged adolescents themselves are more likely to suffer from mental health problems and therefore at increased risk for using substances (Park et al., 2013).

Level of parental education reflects the informational and financial resources in the family. Parents with low level of education may know less about the adverse health effects of cannabis use and therefore express less disapproval of the substance (van der Heide et al., 2013). The lower level of parental monitoring may enable low-SES adolescents to engage more easily in peer groups where substances are available (Jones et al., 2015).

Socioeconomically disadvantaged adolescents are less likely to be committed to school and academic work (Johnson et al., 2007). Disengagement from school and lacking prospects for the future increase the risk for marginalization and experimenting with substances (Henry et al., 2012). Frequent cannabis use may also have become more common among socially marginalized adolescents in recent decades. The increased socioeconomic disparities in the adolescent problem behaviors observed in this study are discussed in the next section.

5.5 Increased socioeconomic disparities and societal changes

The most important finding in this study was that socioeconomic disparities in problem behaviors increased among Finnish adolescents between 2000 and 2015. Although no significant changes were observed in the prevalences of bullying involvement, delinquency, and cannabis use over time in the whole sample, the prevalences of these behaviors increased among adolescents with the most socioeconomic adversities. Similarly, although the prevalence of frequent smoking decreased and that of lifelong nonsmoking increased, no such changes were observed among the most socioeconomically deprived adolescents.

Although the overall level of health and well-being has constantly risen in Finland, the increase has not been equally distributed in the population. Evidence on increased socioeconomic health disparities is strong among Finnish adults (Lahelma et al., 2019; Lumme et al., 2018; Piha et al., 2007; Ruokolainen et al., 2019a). The findings of this study add to the data on increased socioeconomic health disparities among Finnish adolescents as well. Some earlier studies support these findings. Doku et al. (2010) observed that differences in adolescent smoking according to parental education level increased among Finnish adolescents between 1977 and 2007. Torikka et al. (2017, 2014) found increased

socioeconomic disparities among Finnish adolescents in the 21st century in depression, frequent drinking and drunkenness. Increased socioeconomic disparities in adolescent health and well-being have also been observed in other developed countries in the 21st century (Elgar et al., 2015; Frederick et al., 2014; Sigmund et al., 2020).

Finland is a welfare state where socioeconomic health disparities have traditionally been considered minimal. However, since the economic depression of the 1990s, the economic development of the lowest income group has lagged behind that of other income groups (Moisio, 2009). At the same time, the purchasing power of people on social security benefits has decreased (Moisio, 2009). Globalization has resulted in the labor market being less predictable than earlier, and long-term unemployment has become prevalent in society (Rotko et al., 2011). Low level of education, unemployment, and poverty tend to accumulate among the same individuals, and be passed on intergenerationally (Bask et al., 2015). Additionally, today's society is more individualistic than ever before (Grant et al., 2017). As individuals are considered responsible for their own success, one is more often perceived to be responsible for their socioeconomic disadvantage.

As the adolescent SES was measured by parental education, parental unemployment, and family structure, the results of this study imply that socioeconomic disadvantage in the family is more strongly associated with adolescent problem behaviors than earlier. Family is one of the most substantial factors affecting adolescent health and well-being (Chen et al., 2012; Dick et al., 2007; Hartinger-Saunders et al., 2012; Piehler et al., 2015). The ill-being of low-SES families may have increased due to the societal changes discussed above. Problems in the family, such as parental unemployment, financial hardship, and parental stress put a lot of pressure on the adolescent, which can manifest as engagement in problem behaviors.

As discussed in section 5.3, some adolescents from low-SES backgrounds may adopt "the working-class lifestyle" as part of their identities and therefore see engaging in certain risk behaviors as a means of reinforcing their identities (Willis, 1977). For instance, smoking may be considered normative in these adolescents' social environments, although it is perceived negatively in the general population. The identity processes of adolescents from different socioeconomic backgrounds may have diverged in a way that has led to increased differences in problem behaviors between these groups.

Exponentially increased consumption of social media (Pantic, 2014) may partly account for the increased ill-being of low-SES adolescents. As today various social networking apps constitute an essential part of adolescent daily life, adolescents are provided with more tools for comparison. Spending a lot of time on social media has indeed been observed to increase mental health problems, such as depression and anxiety (Pantic, 2014; Seabrook et al., 2016). Socioeconomically deprived adolescents may be especially susceptible to social comparison and feelings of relative deprivation in social media (Seabrook et al., 2016).

Finally, immigration may partly explain the increased socioeconomic disparities in problem behaviors. In 2000, 16,895 people migrated to Finland from other countries, whereas in 2015 the corresponding number was 28,746 (Official Statistics of Finland,

2016). Socioeconomic adversities, such as unemployment and low income, are more prevalent among immigrants than in the indigenous population (Gorodzeisky et al., 2017). In addition, certain adverse health behaviors, such as smoking, are more common in some countries of origin than in Finland (Salama et al., 2018). Young immigrants may also be more often selected as targets of bullying due to standing out from others (Maynard et al., 2016). The higher prevalence of trauma history may also predispose these young people to problem behaviors (Grella et al., 2005). Moreover, if integration into the new host society fails, the immigrant is at high risk of marginalization and poor health. All in all, the increased immigration may have contributed to the increased prevalences of certain problem behaviors among people with socioeconomic adversities. However, immigrant status was not controlled for in this study.

Taken together, these societal changes may have contributed to the widened gap in adolescent problem behaviors between socioeconomic groups in Finland. Reducing socioeconomic health disparities has been a central aim of Finnish health policy for decades, and several policies have been implemented in order to achieve this goal (Rotko et al., 2011). However, despite these efforts it seems that socioeconomic health disparities have not decreased, but on the contrary have actually increased in recent decades. Previous policies to reduce socioeconomic health disparities may not have succeeded in reaching the concrete level.

5.6 Methodological considerations

The results of this study need to be interpreted with certain limitations in mind. As with all studies relying on self-report data, recall bias has to be considered as a possible source of error. For instance, level of parental education may be difficult for the adolescent to recall, which may explain why the proportion of missing responses on this question was greater than on other questions in the survey. However, the proportions of missing responses to all questions in this study were small.

Another source of error in studies relying on self-report data is invalid responding. The tendency to aim at social desirability may result in under-reporting of problem behaviors (Fisher et al., 2008). The experienced stigma around problem behaviors may have decreased over time, which could manifest as adolescents reporting problem behaviors more openly than before. However, it is unlikely that the increases in problem behaviors among adolescents with low SES would be explained only by bolder reporting, as the general trends in problem behaviors seem stable or decreasing. On the other hand, adolescents in particular are inclined to exaggerate their symptoms in survey studies (Robinson-Cimpian, 2014). As with social desirability, however, there is no reason to assume that the exaggeration of problem behaviors would explain the increased socioeconomic disparities observed in this study.

Yet another limitation to be taken into consideration is that potential factors mediating the association between socioeconomic status and adolescent problem behaviors were not controlled for in this study. Examples of these factors include adolescent mental health problems, increased immigration, and the economic recession between 2008 and 2009 (Stuckler et al., 2011). However, the aim of this study was to investigate changes over time in adolescent problem behaviors according to socioeconomic status rather than the mechanisms underlying the changes. Further studies are therefore required to elucidate the causes of the increased socioeconomic disparities in adolescent problem behaviors observed in this study.

Despite the limitations, this study has several strengths. It was based on uniquely extensive and nationally representative data large enough to enable the analysis of time trends in behavioral outcomes (N = 761,278). The school sample of this age group was comprehensive as basic education is compulsory for everyone under the age of 16 in Finland. The sampling and timing of the study were held constant over the study years, and the preservation of the original questions across questionnaires made it possible to study changes in problem behaviors over time. The findings of this study have considerable implications for public health policies and clinical practice as decreasing socioeconomic health disparities continues to be a central aim of Finnish health policy.

6 Implications

6.1 Implications for practice

As the socioeconomic health disparities have increased in Finland in recent decades despite efforts to reduce them, more concrete measures are urgently required. Unfortunately, data on effective interventions among socioeconomically disadvantaged adolescents are scarce. Of the four problem behaviors examined in this study, most evidence is available on smoking interventions. Current smoking prevention and cessation programs may be less effective among individuals from low-SES backgrounds (Fernández et al., 2006; Hiscock et al., 2012; Sheffer et al., 2012). Low-SES adolescents might benefit from programs that attempt to enhance the social support to quit smoking and refute the perception of smoking as a norm (Hiscock et al., 2012).

Family is one of the most decisive factors affecting adolescent well-being (Chen et al., 2012; Dick et al., 2007; Hartinger-Saunders et al., 2012; Piehler et al., 2015). A supportive parent or other caregiver is in a crucial role in the development of the adolescent's resilience to adversities (Chen et al., 2012). On the other hand, lack of parental monitoring is a significant risk factor of adolescent problem behaviors, including smoking, delinquency, and cannabis use (Dick et al., 2007; Hartinger-Saunders et al., 2012; Piehler et al., 2015). Reinforcement of social support from different sources, especially from families, should be taken into consideration in the preventive efforts and interventions addressing these behaviors (Flannery et al., 2016; Hartinger-Saunders et al., 2012; Menesini et al., 2017; Šmigelskas et al., 2018). Intervention models for youth services that emphasize educating parents to monitor and support their children may prove to be the most cost-effective and sustainable (Bruce, 2002; Dong et al., 2017; Hartinger-Saunders et al., 2012; Healy et al., 2014; Kaufman et al., 2018; Mann et al., 2015; Piehler et al., 2015). These interventions need to be tailored for low-SES parents.

Parental illness threatens the well-being of the whole family. Children should always be taken into account in the treatment of parental somatic, mental health, and substance abuse problems. In Finland, an intervention named Let's Talk about the Children (LT; Solantaus et al., 2010) has already been implemented in clinical practice with promising outcomes (Niemelä et al., 2012; Punamäki et al., 2013; Solantaus et al., 2010). LT involves a brief psychoeducational discussion with parents with psychiatric or somatic illness on children's well-being (Solantaus et al., 2010). Finally, it is crucial to support parents' health and well-being to ensure that they have enough resources to support their children (Karimzadeh et al., 2017).

Apart from family, school is the main social environment in adolescence. School-based prevention programs have the ability to reach the whole age group cost-effectively (Ariza et al., 2013; Deogan et al., 2015). The Finnish antibullying program, KiVa, has been successfully implemented in Finland and elsewhere in the world (Nocentini et al., 2016; Salmivalli et al., 2012), and the same idea could be applied to other problem behaviors as well (Deogan et al., 2015; Parks et al., 2018). Interventions aiming at reducing school disengagement among adolescents could reduce problem behaviors in both the short and long term (Henry et al., 2012). In addition, schools should enhance the motivation and abilities of low-SES adolescents to pursue meaningful life paths, including education, integration, and employment. To enable this, the regional disparity between schools needs to be addressed (Karvonen et al., 2018).

Internet-based programs are easily accessible to all and can be implemented at low cost (Tait et al., 2013). Online interventions have already proven successful in reducing smoking and cannabis use among adolescents (Ariza et al., 2013, Rooke et al., 2010; Tait et al., 2013). However, the effectiveness of Internet-based programs requires media literacy, the level of which is lower in low-SES groups (Levin-Zamir et al., 2018). Therefore, these programs should also aim at enhancing media literacy (Primack et al., 2014).

Finally, healthcare professionals and other adults working with adolescents are in an excellent position to intervene in adolescent problem behaviors. They should understand that the values of adolescents may differ greatly from their own, and therefore focusing on the long-term consequences of problem behaviors may not necessarily prove successful. An adolescent may see a problem behavior as part of their identity, and it can play a decisive role in their peer relations. Healthcare workers should encourage adolescents themselves to think of the harms that are relevant to them in their current lives, and compare the risks to the rewards gained from the behavior. Motivational interviewing is a counseling method that encourages the patient to find the internal motivation to change harmful behaviors (Rollnick et al., 1995). It has been widely implemented in the treatment of addictions, and can also be used in addressing other problem behaviors (Miller et al., 2002).

6.2 Implications for policymakers

When it comes to mental health problems, prevention and early intervention are keys. Offering low-threshold mental health services for the young is cost-effective and above all prevents severe psychiatric morbidity, unemployment, and social marginalization in the future. Socioeconomic adversities in the family should be recognized as risk factors of adolescent problem behaviors and vulnerable families should be supported. Preventing social marginalization and enhancing social inclusion requires multiprofessional collaboration across sector boundaries.

With respect to adolescent substance use, the regulation of supply is essential. High cigarette prices have been shown to reduce smoking especially among the young and the socioeconomically disadvantaged, and therefore continuing the progressive increases in tobacco taxes is an effective way to reduce socioeconomic disparities in adolescent smoking (Brown et al., 2014; Ding, 2003; Parks et al., 2017). Also the regulation of new products emerging in the market, such as e-cigarettes, is crucial in reducing smoking among adolescents.

Finally, sociopolitical measures are required to reduce socioeconomic health disparities in the population. Ensuring everyone's right to adequate social support and equal access to health and social services independent of socioeconomic status and the place of residence are essential in reducing health disparities caused by different starting points. Supporting single-parent families and families with multiple children is especially important as a significant number of these families live below the poverty line (Rotko et al., 2011). In addition to reducing long-term unemployment through promoting opportunities for re-employment and making work profitable, the health of the unemployed can be improved through reducing unemployment-related harms by providing change security in the case of job loss, as well as securing adequate health services for the unemployed (Rotko et al., 2011). Finally, the successful integration of immigrants into society improves their health and also enhances overall cohesion and well-being in society.

6.3 Implications for reserch

More needs to be learned about the pathways through which socioeconomic adversity leads to problem behaviors. Likewise, the underlying causes of increased socioeconomic disparities in problem behaviors need further investigation. Socioeconomic disparities may also have increased in other areas of adolescent health and well-being that have so far gone unnoticed. To keep track of the trends in socioeconomic health disparities, establishing and maintaining comprehensive monitoring systems of socioeconomic health disparities in the population is essential.

Evidence-based interventions to improve the health of adolescents with socioeconomic adversities are scarce and thus much needed. The biggest challenge will be solving how these interventions could reach the most vulnerable adolescents, who often tend to remain beyond the reach of services and even of intervention studies themselves.

7 Conclusion

The findings of this study indicate that socioeconomic disparities in problem behaviors increased among Finnish adolescents between 2000 and 2015. Although the overall changes in bullying at school, delinquency, and cannabis use were modest, the prevalences of these behaviors increased among adolescents with the most socioeconomic adversities. Similarly, the overall prevalence of frequent smoking decreased and that of lifelong nonsmoking increased, but no similar changes were observed among adolescents with the most socioeconomic adversities. Concrete actions to reduce socioeconomic health disparities in the population are required. Socioeconomic adversities should be taken into account in the prevention of problem behaviors among adolescents. In addition, securing everyone's right to adequate social support as well as equal access to health and social services independent of socioeconomic status and place of residence is essential in reducing socioeconomic health disparities in the population. Finally, to plan targeted policies and interventions, further knowledge about the underlying mechanisms of the increased socioeconomic health disparities among adolescents is required.

References

Agnew, R., Matthews, S. K., Bucher, J., Welcher, A. N., & Keyes, C. (2008). Socioeconomic status, economic problems, and delinquency. *Youth and Society, 40*(2). https://doi.org/10.1177/0044118X08318119

Ahlborg, M., Svedberg, P., Nyholm, M., Morgan, A., & Nygren, J. M. (2017). Socioeconomic inequalities in health among Swedish adolescents - adding the subjective perspective. *BMC Public Health, 17*(1). https://doi.org/10.1186/s12889-017-4863-x

Aho, N., Gren-Landell, M., & Svedin, C. G. (2016). The prevalence of potentially victimizing events, poly-victimization, and its association to sociodemographic factors. *Journal of Interpersonal Violence, 31*(4), 620–651. https://doi.org/10.1177/0886260514556105

Aizer, A., Doyle, J. J., (2015). Juvenile incarceration, human capital and future crime: Evidence from randomly assigned judges. *The Quarterly Journal of Economics, 130*(2), 759–803. https://doi.org/10.1093/qje/qjv003

Aksglaede, L., Sorensen, K., Petersen, J. H., Skakkebaek, N. E., & Juul, A. (2009). Recent decline in age at breast development: The Copenhagen Puberty Study. *PEDIATRICS, 123*(5), e932–e939. https://doi.org/10.1542/peds.2008-2491

Amato, P. R., & Keith, B. (1991). Parental divorce and the well-being of children: a meta-analysis. *Psychological Bulletin, 110*(1), 26–46. https://doi.org/10.1037/0033-2909.110.1.26

Arain, M., Haque, M., Johal, L., Mathur, P., Nel, W., Rais, A., Sandhu, R., Sharma, S. (2013). Maturation of the adolescent brain. *Neuropsychiatric Disease and Treatment, 9*, 449–461. https://doi.org/10.2147/NDT.S39776

Areba, E. M., Eisenberg, M. E., & McMorris, B. J. (2018). Relationships between family structure, adolescent health status and substance use: Does ethnicity matter? *Journal of Community Psychology, 46*(1), 44–57. https://doi.org/10.1002/jcop.21915

Ariza, C., Pérez, A., Sánchez-Martínez, F., Diéguez, M., Espelt, A., Pasarín, M. I., Suelves, J. M., De la Torre, R., Nebot, M. (2013). Evaluation of the effectiveness of a school-based cannabis prevention program. *Drug and Alcohol Dependence, 132*(1–2), 257–264. https://doi.org/10.1016/j.drugalcdep.2013.02.012

Artazcoz, L., Benach, J., Borrell, C., & Cortès, I. (2004). Unemployment and mental health: understanding the interactions among gender, family roles, and social class. *American Journal of Public Health, 94*(1), 82–88. https://doi.org/10.2105/AJPH.94.1.82

Atakan, Z. (2012). Cannabis, a complex plant: different compounds and different effects on individuals. *Therapeutic Advances in Psychopharmacology, 2*(6), 241–254. https://doi.org/10.1177/2045125312457586

Audrain-McGovern, J., Rodriguez, D., & Kassel, J. D. (2009). Adolescent smoking and depression: evidence for self-medication and peer smoking mediation. *Addiction (Abingdon, England), 104*(10), 1743–1756. https://doi.org/10.1111/j.1360-0443.2009.02617.x

Bask, M., & Bask, M. (2015). Cumulative (dis)advantage and the Matthew effect in life-course analysis. *PLoS One, 10*(11): e0142447. https://doi.org/10.1371/journal.pone.0142447

Benowitz, N. L. (2010). Nicotine addiction. *The New England Journal of Medicine, 362*(24), 2295–2303. https://doi.org/10.1056/NEJMra0809890

Bevacqua, J. (2018). Adding to the rainbow of diversity: Caring for children of polyamorous families. *Journal of Pediatric Health Care*. doi:10.1016/j.pedhc.2018.04.015

Bircher, J., & Kuruvilla, S. (2014). Defining health by addressing individual, social, and environmental determinants: new opportunities for health care and public health. *Journal of Public Health Policy, 35*(3), 363–386. https://doi.org/10.1057/jphp.2014.19

Bjorkenstam, E., Bjorkenstam, C., Vinnerljung, B., Hallqvist, J., & Ljung, R. (2011). Juvenile delinquency, social background and suicide – a Swedish national cohort study of 992 881 young adults. International *Journal of Epidemiology, 40*(6), 1585–1592. https://doi.org/10.1093/ije/dyr127

Björkqvist, K., Österman, K., & Kaukiainen, A. (1992). The development of direct and indirect aggressive strategies in males and females. In *Of Mice and Women* (pp. 51–64). Elsevier. https://doi.org/10.1016/B978-0-12-102590-8.50010-6

Blane, D. (1985). An assessment of the Black Report's explanations of health inequalities. *Sociology of Health & Illness, 7*(3), 423–445. https://doi.org/10.1111/1467-9566.ep10832355

Blos, P. (1967). The second individuation process of adolescence. *The Psychoanalytic Study of the Child, 22*(1), 162–186. https://doi.org/10.1080/00797308.1967.11822595

Bos, H. M. W., Knox, J. R., van Rijn-van Gelderen, L., & Gartrell, N. K. (2016). Same-sex and different-sex parent households and child health outcomes: Findings from the National Survey of Children's Health. *Journal of Developmental and Behavioral Pediatrics: JDBP, 37*(3), 179–187. https://doi.org/10.1097/DBP.0000000000000288

Bosworth, B. (2018). Increasing disparities in mortality by socioeconomic status. *Annual Review of Public Health, 18*, 237–251. https://doi.org/10.1146/annurev-publhealth

Braveman, P. A., Kumanyika, S., Fielding, J., LAveist, T., Borrell, L. N., Manderscheid, R., & Troutman, A. (2011). Health disparities and health equity: The issue is justice. *American Journal of Public Health. 101*(s1), S149–S155. https://doi.org/10.2105/AJPH.2010.300062

Brown, T., Platt, S., & Amos, A. (2014). Equity impact of population-level interventions and policies to reduce smoking in adults: A systematic review. *Drug and Alcohol Dependence, 138*, 7–16. https://doi.org/10.1016/j.drugalcdep.2014.03.001

Bruce, J. (2002). Review: family and parenting interventions reduce subsequent arrests and length of time in institutions in youths with conduct disorder and delinquency. *Evidence-Based Mental Health, 5*(4), 123–123. https://doi.org/10.1136/ebmh.5.4.123

Cao, S., Yang, C., Gan, Y., & Lu, Z. (2015). The health effects of passive smoking: An overview of systematic reviews based on observational epidemiological evidence. *PLOS ONE, 10*(10), e0139907. https://doi.org/10.1371/journal.pone.0139907

Caravaca Sánchez, F., Falcón Romero, M., Navarro-Zaragoza, J., Luna Ruiz-Cabello, A., Rodriges Frantzisko, O., & Luna Maldonado, A. (2016). Prevalence and patterns of traditional bullying victimization and cyber-teasing among college population in Spain. *BMC Public Health, 16*(1), 176. https://doi.org/10.1186/s12889-016-2857-8

Carlson, M. J., & Corcoran, M. E. (2001). Family structure and children's behavioral and cognitive outcomes. *Journal of Marriage and Family, 63*(3), 779–792. https://doi.org/10.1111/j.1741-3737.2001.00779.x

Charitonidi, E., Studer, J., Gaume, J., Gmel, G., Daeppen, J.-B., & Bertholet, N. (2016). Socioeconomic status and substance use among Swiss young men: A population-based cross-sectional study. *BMC Public Health, 16*(1), 333. https://doi.org/10.1186/s12889-016-2949-5

Chen, E., & Miller, G. E. (2012). "Shift-and-persist" strategies: Why low socioeconomic status isn't always bad for health. *Perspectives on Psychological Science, 7*(2), 135–158. https://doi.org/10.1177/1745691612436694

Chester, K. L., Callaghan, M., Cosma, A., Donnelly, P., Craig, W., Walsh, S., & Molcho, M. (2015). Cross-national time trends in bullying victimization in 33 countries among children aged 11, 13 and 15 from 2002 to 2010. *The European Journal of Public Health, 25*(suppl 2), 61–64. https://doi.org/10.1093/eurpub/ckv029

Chetty, R., Stepner, M., Abraham, S., Lin, S., Scuderi, B., Turner, N., Bergeron, A., Cutler, D. (2016). The association between income and life expectancy in the United States, 2001-2014. *JAMA, 315*(16), 1750–1766. https://doi.org/10.1001/jama.2016.4226

Clegg, L. X., Reichman, M. E., Miller, B. A., Hankey, B. F., Singh, G. K., Lin, Y. D., Goodman, M. T., Lynch, C. F., Schwartz, S. M., Chen, V. W., Bernstein, L., Gomez, S. L., Graff, J. J., Lin, C. C., Johnson, N. J., & Edwards, B. K. (2009). Impact of socioeconomic status on cancer incidence and stage at diagnosis: selected findings from the surveillance, epidemiology, and end results: National Longitudinal Mortality Study. *Cancer Causes & Control: CCC, 20*(4), 417–435. https://doi.org/10.1007/s10552-008-9256-0

Coker, K. L., Smith, P. H., Westphal, A., Zonana, H. V., & McKee, S. A. (2014). Crime and psychiatric disorders among youth in the US Population: An analysis of the National Comorbidity Survey–Adolescent Supplement. *Journal of the American Academy of Child & Adolescent Psychiatry, 53*(8), 888-898. https://doi.org/10.1016/j.jaac.2014.05.007

Conger, R. D., Ge, X., Elder, G. H., Lorenz, F. O., Simons, R. L., & Simons, R. L. (1994). Economic stress, coercive family process, and developmental problems of adolescents. *Child Development, 65*(2), 541. https://doi.org/10.2307/1131401

Copeland, W. E., Wolke, D., Angold, A., & Costello, E. J. (2013). Adult psychiatric outcomes of bullying and being bullied by peers in childhood and adolescence. *JAMA Psychiatry, 70*(4), 419–426. https://doi.org/10.1001/jamapsychiatry.2013.504

Copeland, W. E., Wolke, D., Lereya, S. T., Shanahan, L., Worthman, C., & Costello, E. J. (2014). Childhood bullying involvement predicts low-grade systemic inflammation into adulthood. *Proceedings of the National Academy of Sciences of the United States of America, 111*(21), 7570–7575. https://doi.org/10.1073/pnas.1323641111

Craig, W., Harel-Fisch, Y., Fogel-Grinvald, H. et al. A cross-national profile of bullying and victimization among adolescents in 40 countries. *Int J Public Health 54*, 216–224 (2009). https://doi.org/10.1007/s00038-009-5413-9

Crane, R. (2007). The most addictive drug, the most deadly substance: Smoking cessation tactics for the busy clinician. *Primary Care: Clinics in Office Practice, 34*(1), 117–135. https://doi.org/10.1016/j.pop.2007.02.003

Dajas-Bailador, F., & Wonnacott, S. (2004). Nicotinic acetylcholine receptors and the regulation of neuronal signalling. *Trends in Pharmacological Sciences, 25*(6), 317–324. https://doi.org/10.1016/j.tips.2004.04.006

Dam, C. van, Janssens, J. M. A. M., & De Bruyn, E. E. J. (2005). PEN, Big Five, juvenile delinquency and criminal recidivism. *Personality and Individual Differences, 39*(1), 7–19. https://doi.org/10.1016/J.PAID.2004.06.016

Das, J. K., Salam, R. A., Lassi, Z. S., Khan, M. N., Mahmood, W., Patel, V., & Bhutta, Z. A. (2016). Interventions for adolescent mental health: An overview of systematic reviews. *The Journal of Adolescent Health: official publication of the Society for Adolescent Medicine, 59*(4S), S49–S60. https://doi.org/10.1016/j.jadohealth.2016.06.020

Dashiff, C., DiMicco, W., Myers, B., & Sheppard, K. (2009). Poverty and adolescent mental health. *Journal of Child and Adolescent Psychiatric Nursing, 22*(1), 23–32. https://doi.org/10.1111/j.1744-6171.2008.00166.x

de Oliveira, W. A. de, Silva, M. A. I., Mello, F. C. M., Porto, D. L., Yoshinaga, A. C. M., Malta, D. C., … Malta, D. C. (2015). The causes of bullying: results from the National Survey of School Health (PeNSE). *Revista Latino-Americana de Enfermagem, 23*(2), 275–282. https://doi.org/10.1590/0104-1169.0022.2552

Degenhardt, L., Hall, W., & Lynskey, M. (2001). The relationship between cannabis use and other substance use in the general population. *Drug and Alcohol Dependence, 64*(3), 319–327. doi:10.1016/s0376-8716(01)00130-2

Delfabbro, P., Winefield, T., Trainor, S., Dollard, M., Anderson, S., Metzer, J., & Hammarstrom, A. (2006). Peer and teacher bullying/victimization of South Australian secondary school students: Prevalence and psychosocial profiles. *British Journal of Educational Psychology, 76*(1), 71–90. https://doi.org/10.1348/000709904X24645

Delva, J., Wallace, J. M., O'Malley, P. M., Bachman, J. G., Johnston, L. D., Schulenberg, J. E., & Schulenberg, J. E. (2005). The epidemiology of alcohol, marijuana, and cocaine use among Mexican American, Puerto Rican, Cuban American, and other Latin American eighth-grade students in the United States: 1991-2002. *American Journal of Public Health, 95*(4), 696–702. https://doi.org/10.2105/AJPH.2003.037051

Deogan, C., Zarabi, N., Stenström, N., Högberg, P., Skärstrand, E., Manrique-Garcia, E., Neovius, K., & Månsdotter, A. (2015). Cost-effectiveness of school-based prevention of cannabis use. *Applied Health Economics and Health Policy, 13*(5), 525–542. https://doi.org/10.1007/s40258-015-0175-4

Department of Health and Social Security. (1980). *Inequalities in health: Report of a research working group*. London: Department of Health and Social Security.

Dick, D., Viken, R., Purcell, S., Kaprio, J., Pulkkinen, L., & Rose, R. (2007). Parental monitoring moderates the importance of genetic and environmental influences on adolescent smoking. *Journal of Abnormal Psychology, 116*(1), 213-218. https://doi.org/ 10.1037/0021-843X.116.1.213

Ding, A. (2003). Youth are more sensitive to price changes in cigarettes than adults. *The Yale Journal of Biology and Medicine, 76*(3), 115–124.

Doku, D., Koivusilta, L., Rainio, S., & Rimpelä, A. (2010). Socioeconomic differences in smoking among Finnish adolescents from 1977 to 2007. *Journal of Adolescent Health, 47*(5), 479–487. https://doi.org/10.1016/j.jadohealth.2010.03.012

Doll, R., Peto, R., Boreham, J., & Sutherland, I. (2004). Mortality in relation to smoking: 50 years' observations on male British doctors. *BMJ (Clinical Research Ed.), 328*(7455), 1519. https://doi.org/10.1136/bmj.38142.554479.AE

Dong, B., & Krohn, M. D. (2017). The protective effects of family support on the relationship between official intervention and general delinquency across the life course. *Journal of Developmental and Life-Course Criminology, 3*(1), 39–61. https://doi.org/10.1007/s40865-016-0051-4

du Plessis, M. R., Smeekens, S., Cillessen, A. H. N., Whittle, S., & Güroğğlu, B. (2018). Bullying the brain? Longitudinal links between childhood peer victimization, cortisol, and adolescent brain structure. *Frontiers in Psychology, 9*, 2706. https://doi.org/10.3389/fpsyg.2018.02706

Du, Y., Palmer, P. H., Sakuma, K.-L., Blake, J., & Johnson, C. A. (2015). The association between family structure and adolescent smoking among multicultural students in Hawaii. *Preventive Medicine Reports, 2*, 206–212. https://doi.org/10.1016/j.pmedr.2015.03.002

Due, P-, Holstein, P. E., Lynch, J., Diderichsen, F., Gabhainn, S. N., Scheidt, P. C., Currie, C., & Gaspar de Matos, M. (2005). Health Behavior in School-Aged Children. Bullying Working Group. Bullying and symptoms among school-aged children: international comparative cross sectional study in 28 countries. *Eur J Public Health. 2005*;15:128–32. https://doi.org/10.1093/eurpub/cki105

Due, P., Merlo, J., Harel-Fisch, Y., Damsgaard, M. T., Holstein, B. E., Hetland, J., Currie, C., Gabhainn, S. N., de Matos, M. G., & Lynch, J. (2009). Socioeconomic inequality in exposure to bullying during adolescence: a comparative, cross-sectional, multilevel study in 35 countries. *American Journal of Public Health, 99*(5), 907–914. https://doi.org/10.2105/AJPH.2008.139303

Dugré, J. R., Dellazizzo, L., Giguère, C.-É., Potvin, S., & Dumais, A. (2017). Persistency of cannabis use predicts violence following acute psychiatric discharge. *Frontiers in Psychiatry, 8*, 176. https://doi.org/10.3389/fpsyt.2017.00176

Elgar, F. J., Pförtner, T.-K., Moor, I., De Clercq, B., Stevens, G. W. J. M., & Currie, C. (2015). Socioeconomic inequalities in adolescent health 2002–2010: a time-series analysis of 34 countries participating in the Health Behaviour in School-aged Children study. *The Lancet, 385*(9982), 2088–2095. https://doi.org/10.1016/S0140-6736(14)61460-4

Elonheimo, H. (2014). Evidence for the crime drop: survey findings from two Finnish cities between 1992 and 2013. *Journal of Scandinavian Studies in Criminology and Crime Prevention, 15*(2), 209–217. https://doi.org/10.1080/14043858.2014.939458

Elonheimo, H., Sourander, A., Niemelä, S., & Helenius, H. (2011). Generic and crime type specific correlates of youth crime: a Finnish population-based study. *Social Psychiatry and Psychiatric Epidemiology, 46*(9), 903–914. https://doi.org/10.1007/s00127-010-0260-9

Elonheimo, H., Sourander, A., Niemelä, S., Nuutila, A.-M., Helenius, H., Sillanmäki, L., Ristkari, T., & Parkkola, K. (2009). Psychosocial correlates of police-registered youth crime. A Finnish population-based study. *Nordic Journal of Psychiatry, 63*(4), 292–300. https://doi.org/10.1080/08039480902727058

ElSohly, M. A., Mehmedic, Z., Foster, S., Gon, C., Chandra, S., & Church, J. C. (2016). Changes in cannabis potency over the last 2 decades (1995-2014): Analysis of current data in the United States. *Biological Psychiatry, 79*(7), 613–619. https://doi.org/10.1016/j.biopsych.2016.01.004

EMCDDA. (2017a). Cannabis legislation in Europe. Publications Office of the European Union, Luxembourg. https://doi.org/10.2810/930744

EMCDDA. (2017b). Portugal, Country Drug Report 2017. Publications Office of the European Union, Luxembourg. https://doi.org/10.2810/457245

Erikson, E. H. (1950). *Childhood and Society*. New York: Norton.

ESPAD Group (2016). ESPAD Report 2015: *Results from the European School Survey Project on Alcohol and Other Drugs*. Publications Office of the European Union, Luxembourg.

Fazel, S., Doll, H., & Långström, N. (2008). Mental disorders among adolescents in juvenile detention and correctional facilities: A systematic review and metaregression analysis of 25 Surveys. *Journal of the American Academy of Child & Adolescent Psychiatry, 47*(9), 1010–1019. https://doi.org/10.1097/CHI.ObO13e31817eecf3

Ferguson, H., Bovaird, S., & Mueller, M. (2007). The impact of poverty on educational outcomes for children. *Paediatrics & Child Health, 12*(8), 701–706. https://doi.org/10.1093/pch/12.8.701

Fernández, E., Schiaffino, A., Borrell, C., Benach, J., Ariza, C., Ramon, J. M., Twose, J., Nebot, M., & Kunst, A. (2006). Social class, education, and smoking cessation: Long-term follow-up of patients treated at a smoking cessation unit. *Nicotine & Tobacco Research, 8*(1), 29–36. https://doi.org/10.1080/14622200500264432

Findikaattori (2017). Nuorten kokonaisrikollisuus [web page]. Retrieved November 24, 2018, from https://findikaattori.fi/fi/96

Finkelhor, D., Shattuck, A., Turner, H. A., & Hamby, S. L. (2014). Trends in children's exposure to violence, 2003 to 2011. *JAMA Pediatrics, 168*(6), 540–546. https://doi.org/10.1001/jamapediatrics.2013.5296

Fiscella, K., & Williams, D. R. (2004). Health disparities based on socioeconomic inequities: implications for urban health care. *Academic Medicine: Journal of the Association of American Medical Colleges, 79*(12), 1139–1147. doi:10.1097/00001888-200412000-00004

Flannery, D. J., Todres, J., Bradshaw, C. P., Amar, A. F., Graham, S., Hatzenbuehler, M., Masiello M., Moreno M., Sullivan R., Vaillancourt T., Le Menestrel S. M., & Rivara, F. (2016). Bullying prevention: A summary of the report of the National Academies of Sciences, Engineering, and Medicine. *Prevention Science, 17*(8), 1044–1053. https://doi.org/10.1007/s11121-016-0722-8

Frederick, C. B., Snellman, K., & Putnam, R. D. (2014). Increasing socioeconomic disparities in adolescent obesity. *Proceedings of the National Academy of Sciences of the United States of America, 111*(4), 1338–1342. https://doi.org/10.1073/pnas.1321355110

Fu, Q., Land, K. C., & Lamb, V. L. (2013). Bullying victimization, socioeconomic status and behavioral characteristics of 12th graders in the United States, 1989 to 2009: Repetitive trends and persistent risk differentials. *Child Indicators Research, 6*(1), 1–21. https://doi.org/10.1007/s12187-012-9152-8

Fuller-Thomson, E., Mehta, R., & Sulman, J. (2013). Long-term parental unemployment in childhood and subsequent chronic fatigue syndrome. *ISRN Family Medicine*, 2013, 978250. https://doi.org/10.5402/2013/978250

Gadalla, T. M. (2012). Unhealthy behaviours among Canadian adolescents: prevalence, trends and correlates. *Chronic Diseases and Injuries in Canada, 32*(3), 156–163.

Gaete, J., Tornero, B., Valenzuela, D., Rojas-Barahona, C. A., Salmivalli, C., Valenzuela, E., & Araya, R. (2017). Substance use among adolescents involved in bullying: A cross-sectional multilevel study. *Frontiers in Psychology, 8*, 1056. https://doi.org/10.3389/fpsyg.2017.01056

Galobardes, B., Shaw, M., Lawlor, D. A., Lynch, J. W., & Davey Smith, G. (2006a). Indicators of socioeconomic position (part 1). *Journal of Epidemiology and Community Health, 60*(1), 7–12. https://doi.org/10.1136/jech.2004.023531

Galobardes, B., Shaw, M., Lawlor, D. A., Lynch, J. W., & Davey Smith, G. (2006b). Indicators of socioeconomic position (part 2). *Journal of Epidemiology & Community Health, 60*(2), 95–101. https://doi.org/10.1136/jech.2004.028092

Gfroerer, J. C., Larson, S. L., & Colliver, J. D. (2007). Drug use patterns and trends in rural communities. *The Journal of Rural Health, 23*(s1), 10–15. https://doi.org/10.1111/j.1748-0361.2007.00118.x

Giedd, J. N. (2008). The teen brain: Insights from neuroimaging. *Journal of Adolescent Health, 42*(4), 335–343. doi:10.1016/j.jadohealth.2008.01.007

Gielkens-Sijstermans, C. M., Mommers, M. A., Hoogenveen, R. T., Feenstra, T. L., de Vreede, J., Bovens, F. M., & van Schayck, O. C. (2010). Reduction of smoking in Dutch adolescents over the past decade and its health gains: a repeated cross-sectional study. *The European Journal of Public Health, 20*(2), 146–150. https://doi.org/10.1093/eurpub/ckp115

Giskes, K., Kunst, A.E., Benach, J., Borrell, C., Costa, G., Dahl, E., Dalstra, J. A., Federico, B., Helmert, U., Judge, K., Lahelma, E., Moussa, K., Ostergren, P. O., Platt, S., Prattala, R., Rasmussen, N. K., Mackenbach, J. P. (2005). Trends in smoking behaviour between 1985 and 2000 in nine European countries by education. *Journal of Epidemiology and Community Health, 59*(5):395–401. https://doi.org/10.1136/jech.2004.025684

Gloss, D. An overview of products and bias in research. *Neurotherapeutics 12*, 731–734 (2015). https://doi.org/10.1007/s13311-015-0370-x

Goodnight, J. A., D'Onofrio, B. M., Cherlin, A. J., Emery, R. E., Van Hulle, C. A., & Lahey, B. B. (2013). Effects of multiple maternal relationship transitions on offspring antisocial behavior in childhood and adolescence: A cousin-comparison analysis. *Journal of Abnormal Child Psychology, 41*(2), 185–198. https://doi.org/10.1007/s10802-012-9667-y

Graham, H., & Kelly, M. P. (2004). *Health inequalities: concepts, frameworks and policy*. London: Health Development Agency.

Graif, C., Gladfelter, A. S., & Matthews, S. A. (2014). Urban poverty and neighborhood effects on crime: Incorporating spatial and network perspectives. *Sociology Compass, 8*(9), 1140–1155. https://doi.org/10.1111/soc4.12199

Grant, G. B. (2017). Exploring the possibility of peak individualism, humanity's existential crisis, and an emerging age of purpose. *Frontiers in psychology, 8*, 1478. https://doi.org/10.3389/fpsyg.2017.01478

Grella, C. E., Stein, J. A., & Greenwell, L. (2005). Associations among childhood trauma, adolescent problem behaviors, and adverse adult outcomes in substance-abusing women offenders. *Psychology of Addictive Behaviors, 19*(1), 43–53. https://doi.org/10.1037/0893-164X.19.1.43

Gripe, I., Ramstedt, M., Karlsson, P., & Danielsson, A.-K. (2017). Is cannabis use among young people in Sweden related to socioeconomic status? *European Journal of Public Health, 27*(s3). https://doi.org/10.1093/eurpub/ckx187.312

Grucza, R. A., Krueger, R. F., Agrawal, A., Plunk, A. D., Krauss, M. J., Bongu, J., ... Bierut, L. J. (2018). Declines in prevalence of adolescent substance use disorders and delinquent behaviors in the USA: a unitary trend? *Psychological Medicine, 48*(09), 1494–1503. https://doi.org/10.1017/S0033291717002999

Hakkarainen, Pekka & Karjalainen, Karoliina 2017. Pilvee, pilvee. Kannabiksen käyttötavat, käyttäjät ja poliittiset mielipiteet. *Yhteiskuntapolitiikka 82*:1, 19-32.

Hall, W., & Degenhardt, L. (2008). Cannabis use and the risk of developing a psychotic disorder. *World Psychiatry, 7*(2), 68–71. https://doi.org/10.1002/j.2051-5545.2008.tb00158.x

Härkönen, J., Lindberg, M., Karlsson, L., Karlsson, H., & Scheinin, N. M. (2018). Education is the strongest socio-economic predictor of smoking in pregnancy. *Addiction, 113*(6), 1117–1126. https://doi.org/10.1111/add.14158

Hartinger-Saunders, R. M., Rine, C. M., Wieczorek, W., & Nochajski, T. (2012). Family level predictors of victimization and offending among young men: Rethinking the role of parents in prevention and interventions models. *Children and Youth Services Review, 34*(12), 2423–2432. https://doi.org/10.1016/j.childyouth.2012.08.017

Hay, C., Fortson, E. N., Hollist, D. R., Altheimer, I., & Schaible, L. M. (2007). Compounded risk: The implications for delinquency of coming from a poor family that lives in a poor community. *Journal of Youth and Adolescence, 36*(5), 593–605. https://doi.org/10.1007/s10964-007-9175-5

Hayatbakhsh, M. R., Najman, J. M., Bor, W., O'Callaghan, M. J., & Williams, G. M. (2009). Multiple risk factor model predicting cannabis use and use disorders: A longitudinal study. *The American Journal of Drug and Alcohol Abuse, 35*(6), 399–407. https://doi.org/10.3109/00952990903353415

Hayford, S. R., & Furstenberg, F. F., Jr. (2008). Delayed adulthood, delayed desistance? Trends in the age distribution of problem behaviors. *Journal of research on adolescence, 18*(2), 285–304). https://doi.org/10.1111/j.1532-7795.2008.00561

Haynie, D. L., & Osgood, D. W. (2005). Reconsidering peers and delinquency: How do peers matter? *Social Forces, 84*(2), 1109–1130. https://doi.org/10.1353/sof.2006.0018

Healy, K. L., & Sanders, M. R. (2014). Randomized controlled trial of a family intervention for children bullied by peers. *Behavior Therapy, 45*(6), 760–777. https://doi.org/10.1016/j.beth.2014.06.001

Helakorpi, S., Martelin, T., Torppa, J., Vartiainen, E., Uutela, A., & Patja, K. (2008). Impact of the 1976 Tobacco Control Act in Finland on the proportion of ever daily smokers by socioeconomic status. *Preventive Medicine, 46*(4), 340–345. doi:10.1016/j.ypmed.2007.11.001

Hemphill, S. A., Kotevski, A., Herrenkohl, T. I., Bond, L., Kim, M. J., Toumbourou, J. W., & Catalano, R. F. (2011). Longitudinal consequences of adolescent bullying perpetration and victimisation: a study of students in Victoria, Australia. *Criminal Behaviour and Mental Health, 21*(2), 107–116. https://doi.org/10.1002/cbm.802

Henry, K. L., Knight, K. E., & Thornberry, T. P. (2012). School disengagement as a predictor of dropout, delinquency, and problem substance use during adolescence and early adulthood. *Journal of Youth and Adolescence, 41*(2), 156–166. https://doi.org/10.1007/s10964-011-9665-3

Hiscock, R., Bauld, L., Amos, A., Fidler, J. A., & Munafò, M. (2012). Socioeconomic status and smoking: a review. *Annals of the New York Academy of Sciences, 1248*(1), 107–123. https://doi.org/10.1111/j.1749-6632.2011.06202.x

Hishinuma, E. S., Chang, J. Y., & Soli, F. M. (2012). Community perceptions of safety in relation to perceived youth violence-delinquency in a primarily native Hawaiian and Asian American community in Hawaii. *Journal of Community Health: The Publication for Health Promotion and Disease Prevention, 37*(1), 123–136. https://doi.org/10.1007/s10900-011-9426-y

Hoeve, M., Dubas, J. S., Eichelsheim, V. I., van der Laan, P. H., Smeenk, W., & Gerris, J. R. M. (2009). The relationship between parenting and delinquency: A meta-analysis. *Journal of Abnormal Child Psychology, 37*(6), 749–775. https://doi.org/10.1007/s10802-009-9310-8

Hopfer, C. (2014). Implications of marijuana legalization for adolescent substance use. *Substance Abuse, 35*(4), 331–335. https://doi.org/10.1080/08897077.2014.943386

Hunter, S. C., Durkin, K., Boyle, J. M. E., Booth, J. N., & Rasmussen, S. (2014). Adolescent bullying and sleep difficulties. *Europe's Journal of Psychology, 10*(4), 740–755. https://doi.org/10.5964/ejop.v10i4.815

Inchley, J., Currie, D., Young, T., Samdal, O., Torbjørn, T., Augustson, L., MAthison, F., Aleman-Diaz, A., Molcho, M., Weber, M., & Barnekow, B. (Eds). (2016) *Growing up unequal: gender and socioeconomic differences in young people's health and well-being.* Health Behaviour in School-aged Children (HBSC) study: international report from the 2013/2014 survey. Copenhagen, WHO Regional Office for Europe (Health Policy for Children and Adolescents, No. 7).

Isir, A. B., Tokdemir, M., Küçüker, H., & Dulger, H. E. (2007). Role of family factors in adolescent delinquency in an Elazig/Turkey reformatory. *Journal of Forensic Sciences, 52*(1), 125–127. https://doi.org/10.1111/j.1556-4029.2006.00313.x

Jablonska, B., & Lindberg, L. (2007). Risk behaviours, victimisation and mental distress among adolescents in different family structures. *Social Psychiatry and Psychiatric Epidemiology, 42*(8), 656–663. https://doi.org/10.1007/s00127-007-0210-3

Jansen, D. E., Veenstra, R., Ormel, J., Verhulst, F. C., & Reijneveld, S. A. (2011). Early risk factors for being a bully, victim, or bully/victim in late elementary and early secondary education. The longitudinal TRAILS study. *BMC Public Health, 11*(1), 440. https://doi.org/10.1186/1471-2458-11-440

Jansen, P. W., Verlinden, M., Berkel, A. D., Mieloo, C., van der Ende, J., Veenstra, R., Verhulst, F. C., Jansen, W., & Tiemeier, H. (2012). Prevalence of bullying and victimization among children in early elementary school: Do family and school neighbourhood socioeconomic status matter? *BMC Public Health, 12*(1), 494. https://doi.org/10.1186/1471-2458-12-494

Jessor, R. (1992). Risk behavior in adolescence: A psychosocial framework for understanding and action. *Developmental Review, 12*(4), 374–390. https://doi.org/10.1016/0273-2297(92)90014-S

Jessor, R., Donovan, J. E., & Costa, F. M. (1991). *Beyond adolescence: Problem behavior and young adult development*. New York, US: Cambridge University Press.

Jessor, R., & Jessor, S. L. (1977). *Problem behavior and psychosocial development: a longitudinal study of youth*. New York, US: New York Academic Press.

Jin, R. L., Shah, C. P., & Svoboda, T. J. (1995). The impact of unemployment on health: a review of the evidence. *Canadian Medical Association Journal, 153*(5), 529–540.

Johnson, W., McGue, M., & Iacono, W. G. (2007). Socioeconomic status and school grades: Placing their association in broader context in a sample of biological and adoptive families. *Intelligence, 35*(6), 526–541. https://doi.org/10.1016/j.intell.2006.09.006

Jones, J. D., Ehrlich, K. B., Leujez, C. W., & Cassidy, J. (2015). Parental knowledge of adolescent activities: links with parental attachment style and adolescent substance use. *Journal of family psychology, 29*(2), 191–200. https://doi.org/10.1037/fam0000070

Jones, J., Nicole Jones, K., & Peil, J. (2018). The impact of the legalization of recreational marijuana on college students. *Addictive Behaviors, 77*, 255–259. https://doi.org/10.1016/J.ADDBEH.2017.08.015

Junger-Tas, J., Terlouw, G.-J., & Klein, M. W. (1994). *Delinquent behavior among young people in the western world: First results of the international self-report delinquency study*. Amsterdam: Kugler.

Kaltiala-Heino, R., & Fröjd, S. (2011). Correlation between bullying and clinical depression in adolescent patients. *Adolescent Health, Medicine and Therapeutics, 2*, 37–44. https://doi.org/10.2147/AHMT.S11554

Kaltiala-Heino, R., Fröjd, S., & Marttunen, M. (2010). Involvement in bullying and depression in a 2-year follow-up in middle adolescence. *European Child & Adolescent Psychiatry, 19*(1), 45–55. https://doi.org/10.1007/s00787-009-0039-2

Karila, L., Roux, P., Rolland, B., Benyamina, A., Reynaud, M., Aubin, H.-J., & Lançon, C. (2014). Acute and long-term effects of cannabis use: a review. *Current Pharmaceutical Design, 20*(25), 4112–4118. https://doi.org/10.2174/13816128113199990620

Karimzadeh, M., Rostami, M., Teymouri, R., Moazzen, Z., & Tahmasebi, S. (2017). The association between parental mental health and behavioral disorders in pre-school children. *Electronic Physician, 9*(6), 4497–4502. https://doi.org/10.19082/4497

Karvonen, S., Tokola, K., & Rimpelä, A. (2018). Well-being and academic achievement: Differences between schools from 2002 to 2010 in the Helsinki metropolitan area. *The Journal of School Health, 88*(11), 821–829. https://doi.org/10.1111/josh.12691

Kaufman, T. M. L., Kretschmer, T., Huitsing, G., & Veenstra, R. (2018). Why does a universal anti-bullying program not help all children? Explaining persistent victimization during an intervention. *Prevention Science, 19*(6), 822–832. https://doi.org/10.1007/s11121-018-0906-5

Kedzior, K. K., & Laeber, L. T. (2014). A positive association between anxiety disorders and cannabis use or cannabis use disorders in the general population- a meta-analysis of 31 studies. *BMC Psychiatry, 14*(1), 136. https://doi.org/10.1186/1471-244X-14-136

Kelsey, C., Zeman, J., & Dallaire, D. (2017). Emotion correlates of bullies, victims, and bully-victims in African American children. *Journal of Black Psychology, 43*(7), 688–713. https://doi.org/10.1177/0095798416680719

King, A., Wold, B., Tudor-Smith, C., Harel, Y. (1996). The health of youth. A cross-national survey. WHO Regional publications. *European Series*, 1996; 69:1-222.

Kingston, S. (2015). The most "undeserving" of all? How poverty drives young men to victimisation and crime. *Journal of Poverty and Social Justice, 23*, 215–242. https://doi.org/10.1332/175982715X14448287452303

Klein, J., Hofreuter-Gätgens, K., Lüdecke, D., Fisch, M., Graefen, M., & von dem Knesebeck, O. (2016). Socioeconomic status and health-related quality of life among patients with prostate cancer 6 months after radical prostatectomy: a longitudinal analysis. *BMJ Open, 6*(6): e010968. https://doi.org/10.1136/bmjopen-2015-010968

Koch, C. E., Leinweber, B., Drengberg, B. C., Blaum, C., & Oster, H. (2017). Interaction between circadian rhythms and stress. *Neurobiology of Stress, 6*, 57–67. https://doi.org/10.1016/j.ynstr.2016.09.001

Kohn, L., Dramaix, M., Favresse, D., Kittel, F., & Piette, D. (2005). Trends in cannabis use and its determinants among teenagers in the French-speaking community of Belgium. *Revue d'epidemiologie et de Sante Publique, 53*(1), 3–13. https://doi.org/10.1016/s0398-7620(05)84568-7

Koolhof, R., Loeber, R., Wei, E. H., Pardini, D., & D'escury, A. C. (2007). Inhibition deficits of serious delinquent boys of low intelligence. *Criminal Behaviour and Mental Health, 17*(5), 274–292. https://doi.org/10.1002/cbm.661

Krieger, N., Williams, D. R., & Moss, N. E. (1997). Measuring social class in US public health research: Concepts, methodologies, and guidelines. *Annual Review of Public Health, 18*(1), 341–378. https://doi.org/10.1146/annurev.publhealth.18.1.341

Kuntz, B., & Lampert, T. (2016). Smoking and passive smoke exposure among adolescents in Germany. *Deutsches Arzteblatt International, 113*(3), 23–30. https://doi.org/10.3238/arztebl.2016.0023

Lahelma, E., Pietiläinen, O., Pentala-Nikulainen, O., Helakorpi, S., & Rahkonen, O. (2019). 36-year trends in educational inequalities in self-rated health among Finnish adults. *SSM – Population Health, 9*, 100504. https://doi.org/10.1016/j.ssmph.2019.100504

Lallukka, T., Kerkelä, M., Ristikari, T., MErikukka, M., Hiilamo, H., Virtanen, M., Øverland, S., Gissler, M., & Halonen, J. I. (2019). Determinants of long-term unemployment in early adulthood: A Finnish birth cohort study. *SSM – Population Health, 8*, 100410. https://doi.org/10.1016/j.ssmph.2019.100410

Ledoux, S., Miller, P., Choquet, M., & Plant, M. (2002). Family structure, parent-child relationships, and alcohol and other drug use among teenagers in France and the United Kingdom. *Alcohol and Alcoholism (Oxford, Oxfordshire), 37*(1), 52–60. https://doi.org/10.1093/alcalc/37.1.52

Ledwell, M., & King, V. (2015). Bullying and internalizing problems: Gender differences and the buffering role of parental communication. *Journal of Family Issues, 36*(5), 543–566. https://doi.org/10.1177/0192513X13491410

Legleye, S., Beck, F., Khlat, M., Peretti-Watel, P., & Chau, N. (2012). The influence of socioeconomic status on cannabis use among French adolescents. *Journal of Adolescent Health, 50*(4), 395–402. https://doi.org/10.1016/J.JADOHEALTH.2011.08.004

Lessov-Schlaggar, C. N., Pergadia, M. L., Khroyan, T. V., & Swan, G. E. (2008). Genetics of nicotine dependence and pharmacotherapy. *Biochemical Pharmacology, 75*(1), 178–195. https://doi.org/10.1016/j.bcp.2007.08.018

Levin-Zamir, D., & Bertschi, I. (2018). Media health literacy, eHealth literacy, and the role of the social environment in context. *International Journal of Environmental Research and Public Health, 15*(8). https://doi.org/10.3390/ijerph15081643

Leyton, M. (2016). Legalizing marijuana. *Journal of Psychiatry & Neuroscience, 41*(2), 75–76. https://doi.org/10.1503/JPN.160012

Lopez, A. D., Collishaw, N. E., & Piha, T. (1994). A descriptive model of the cigarette epidemic in developed countries. *Tobacco Control, 3*(3), 242–247. https://doi.org/10.1136/tc.3.3.242

Lumme, S., Manderbacka, K., Karvonen, S., & Keskimäki, I. (2018). Trends of socioeconomic equality in mortality amenable to healthcare and health policy in 1992-2013 in Finland: a population-based register study. *BMJ Open, 8*(12): e023680. https://doi.org/10.1136/bmjopen-2018-023680.

Luukkonen, A.-H., Räsänen, P., Hakko, H., Riala, K., & STUDY-70 Workgroup. (2010). Bullying behavior in relation to psychiatric disorders and physical health among adolescents: A clinical cohort of 508 underage inpatient adolescents in Northern Finland. *Psychiatry Research, 178*(1), 166–170. https://doi.org/10.1016/j.psychres.2010.04.022

Magklara, K., Skapinakis, P., Gkatsa, T., Bellos, S., Araya, R., Stylianidis, S., & Mavreas, V. (2012). Bullying behaviour in schools, socioeconomic position and psychiatric morbidity: a cross-sectional study in late adolescents in Greece. *Child and Adolescent Psychiatry and Mental Health, 6*, 8. https://doi.org/10.1186/1753-2000-6-8

Manderbacka, K., Arffman, M., Satokangas, M., & Keskimäki, I. (2019). Regional variation of avoidable hospitalisations in a universal health care system: a register-based cohort study from Finland 1996–2013. *BMJ Open, 9*(7): e029592. https://doi.org/10.1136/bmjopen-2019-029592

Mann, E. A., & Reynolds, A. J. (2006). Early intervention and juvenile delinquency prevention: Evidence from the Chicago Longitudinal Study. *Social Work Research, 30*(3), 153–167. https://doi.org/10.1093/swr/30.3.153

Mann, M. J., Kristjansson, A. L., Sigfusdottir, I. D., & Smith, M. L. (2015). The role of community, family, peer, and school factors in group bullying: Implications for school-based intervention. *Journal of School Health, 85*(7), 477–486. https://doi.org/10.1111/josh.12270

Marceau, K., Ram, N., Houts, R. M., Grimm, K. J., & Susman, E. J. (2011). Individual differences in boys' and girls' timing and tempo of puberty: Modeling development with nonlinear growth models. *Developmental Psychology, 47*(5), 1389–1409. https://doi.org/10.1037/a0023838

Marmot, M. G. (2003). Understanding social inequalities in health. *Perspectives in Biology and Medicine, 46*(3), S9–S23. https://doi.org/10.1353/pbm.2003.0070

Mason, W. A., & Windle, M. (2002). Reciprocal relations between adolescent substance use and delinquency: A longitudinal latent variable analysis. *Journal of Abnormal Psychology, 111*(1), 63–76. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/11866180

Maxwell, J. C., & Mendelson, B. (2016). What do we know now about the impact of the laws related to marijuana? *Journal of Addiction Medicine, 10*(1), 3–12. https://doi.org/10.1097/ADM.0000000000000188

Maynard, B. R., Vaughn, M. G., Salas-Wright, C. P., & Vaughn, S. (2016). Bullying victimization among school-aged immigrant youth in the United States. *The Journal of Adolescent Health, 58*(3), 337–344. https://doi.org/10.1016/j.jadohealth.2015.11.013

McCollister, K. E., French, M. T., & Fang, H. (2010). The cost of crime to society: New crime-specific estimates for policy and program evaluation. *Drug and Alcohol Dependence, 108*(1–2), 98–109. https://doi.org/10.1016/J.DRUGALCDEP.2009.12.002

Meier, M. H., Slutske, W. S., Arndt, S., & Cadoret, R. J. (2008). Impulsive and callous traits are more strongly associated with delinquent behavior in higher risk neighborhoods among boys and girls. *Journal of Abnormal Psychology, 117*(2), 377–385. https://doi.org/10.1037/0021-843X.117.2.377

Melchior, M., Choquet, M., Le Strat, Y., Hassler, C., & Gorwood, P. (2011). Parental alcohol dependence, socioeconomic disadvantage and alcohol and cannabis dependence among young adults in the community. *European Psychiatry, 26*(1), 13–17. https://doi.org/10.1016/j.eurpsy.2009.12.011

Menesini, E., & Salmivalli, C. (2017). Bullying in schools: the state of knowledge and effective interventions. *Psychology, Health & Medicine, 22*(sup1), 240–253. https://doi.org/10.1080/13548506.2017.1279740

Merrill, R. M., & Hanson, C. L. (2016). Risk and protective factors associated with being bullied on school property compared with cyberbullied. B*MC Public Health, 16*, 145. https://doi.org/10.1186/s12889-016-2833-3

Mersky, J. P., Topitzes, J., & Reynolds, A. J. (2012). Unsafe at any age: Linking childhood and adolescent maltreatment to delinquency and crime. *The Journal of Research in Crime and Delinquency, 49*(2), 295–318. https://doi.org/10.1177/0022427811415284

Milad, M. R., & Quirk, G. J. (2012). Fear extinction as a model for translational neuroscience: Ten years of progress. *Annual Review of Psychology, 63*(1), 129–151. https://doi.org/10.1146/annurev.psych.121208.131631

Miller, W. R., & Rollnick, S. (2002). *Motivational interviewing: Preparing people for change* (2nd ed.). The Guildford Press.

Ministry of Social Affairs and Health (2018). Development of tobacco and nicotine policy. Proposals for action by the working group. Reports and Memorandums of the Ministry of Social Affairs and Health 21/2018. http://urn.fi/URN:ISBN:978-952-00-3934-9

Moberg, D. P., & Rettammel, R. J. (2001). Tobacco use trends and correlates among students in the Madison Metropolitan School District. *WMJ: Official Publication of the State Medical Society of Wisconsin, 100*(3), 43–48.

Modecki, K. L., Minchin, J., Harbaugh, A. G., Guerra, N. G., & Runions, K. C. (2014). Bullying prevalence across contexts: A meta-analysis measuring cyber and traditional bullying. *Journal of Adolescent Health, 55*(5), 602–611. https://doi.org/10.1016/j.jadohealth.2014.06.007

Moffitt, T. E. (2005). The new look of behavioral genetics in developmental psychopathology: Gene-environment interplay in antisocial behaviors. *Psychological Bulletin, 131*(4), 533–554. https://doi.org/10.1037/0033-2909.131.4.533

Moffitt, T. E. (1993). Adolescence-limited and life-course-persistent antisocial behavior: A developmental taxonomy. *Psychological Review, 100*(4), 674–701. https://doi.org/10.1037/0033-295x.100.4.674

Moisio, P. (2009). Vähimmäisturva ja köyhyysraja Suomessa: Selvitys sosiaaliturvan kokonaisuudistus (Sata) -komitealle. Terveyden ja hyvinvoinnin laitos (THL), *Avauksia 9*/2009.

Monte, A. A., Zane, R. D., & Heard, K. J. (2015). The implications of marijuana legalization in Colorado. *JAMA, 313*(3), 241–242. https://doi.org/10.1001/jama.2014.17057

Moor, I., Rathmann, K., Lenzi, M., Pfortner, T. K., Nagelhout, G. E., de Looze, M., Bendtsen, P., Willemsen, M., Kannas, L., Anton, E., & Richter, M. (2015). Socioeconomic inequalities in adolescent smoking across 35 countries: a multilevel analysis of the role of family, school and peers. *The European Journal of Public Health, 25*(3), 457–463. https://doi.org/10.1093/eurpub/cku244

Moore, S. E., Norman, R. E., Suetani, S., Thomas, H. J., Sly, P. D., & Scott, J. G. (2017). Consequences of bullying victimization in childhood and adolescence: A systematic review and meta-analysis. *World Journal of Psychiatry, 7*(1), 60. https://doi.org/10.5498/wjp.v7.i1.60

Moss, H. B., Lynch, K. G., & Hardie, T. L. (2003). Affiliation with deviant peers among children of substance dependent fathers from pre-adolescence into adolescence: associations with problem behaviors. *Drug and Alcohol Dependence, 71*(2), 117–125. https://doi.org/10.1016/s0376-8716(03)00073-5

Moustgaard, H., Avendano, M., & Martikainen, P. (2018). Parental unemployment and offspring psychotropic medication purchases: A longitudinal fixed-effects analysis of 138,644 adolescents. *American Journal of Epidemiology, 187*(9), 1880–1888. https://doi.org/10.1093/aje/kwy084

Murray, J., & Farrington, D. P. (2010). Risk factors for conduct disorder and delinquency: Key findings from longitudinal studies. *The Canadian Journal of Psychiatry, 55*(10), 633–642. https://doi.org/10.1177/070674371005501003

Nestler, E. J. (2005). Is there a common molecular pathway for addiction? *Nature Neuroscience, 8*(11), 1445–1449. https://doi.org/10.1038/nn1578

Niemelä, M., Repo, J., Wahlberg, K.-E., Hakko, H., & Räsänen, S. (2012). Pilot evaluation of the impact of structured child-centered interventions on psychiatric symptom profile of parents with serious somatic illness: Struggle for Life trial. *Journal of Psychosocial Oncology, 30*(3), 316–330. https://doi.org/10.1080/07347332.2012.664258

Nijhof, K. S., de Kemp, R. A. T., & Engels, R. C. M. E. (2009). Frequency and seriousness of parental offending and their impact on juvenile offending. *Journal of Adolescence, 32*(4), 893–908. https://doi.org/10.1016/J.ADOLESCENCE.2008.10.005

Nocentini, A., & Menesini, E. (2016). KiVa anti-bullying program in Italy: Evidence of effectiveness in a randomized control trial. *Prevention Science, 17*(8), 1012–1023. https://doi.org/10.1007/s11121-016-0690-z

Nordhagen, R., Nielsen, A., Stigum, H., & Kohler, L. (2005). Parental reported bullying among Nordic children: a population-based study. *Child: Care, Health and Development, 31*(6), 693–701. https://doi.org/10.1111/j.1365-2214.2005.00559.x

Official Statistics of Finland (2016). Migration [e-publication]. Statistics Finland. Retrieved January 10, 2020, from http://www.stat.fi/til/muutl/2015/muutl_2015_2016-05-17_tie_001_en.html

Okoli, C., Greaves, L., & Fagyas, V. (2013). Sex differences in smoking initiation among children and adolescents. *Public Health, 127*(1), 3–10. https://doi.org/10.1016/j.puhe.2012.09.015

Olweus, D. (1994). Bullying at school: basic facts and effects of a school based intervention program. *Journal of Child Psychology and Psychiatry, 35*(7), 1171–1190. https://doi.org/10.1111/j.1469-7610.1994.tb01229.x

Orlando, M., Tucker, J. S., Ellickson, P. L., & Klein, D. J. (2004). Developmental trajectories of cigarette smoking and their correlates from early adolescence to young adulthood. *Journal of Consulting and Clinical Psychology, 72*(3), 400–410. https://doi.org/10.1037/0022-006X.72.3.400

Ouellet-Morin, I., Wong, C. C. Y., Danese, A., Pariante, C. M., Papadopoulos, A. S., Mill, J., & Arseneault, L. (2013). Increased serotonin transporter gene (SERT) DNA methylation is associated with bullying victimization and blunted cortisol response to stress in childhood: a longitudinal study of discordant monozygotic twins. *Psychological Medicine, 43*(9), 1813–1823. https://doi.org/10.1017/S0033291712002784

Ouellet-Morin, Isabelle, Odgers, C. L., Danese, A., Bowes, L., Shakoor, S., Papadopoulos, A. S., Caspi, A., Moffitt, T. E., & Arseneault, L. (2011). Blunted cortisol responses to stress signal social and behavioral problems among maltreated/bullied 12-year-old children. *Biological Psychiatry, 70*(11), 1016–1023. https://doi.org/10.1016/j.biopsych.2011.06.017

Pacher, P., Bátkai, S., & Kunos, G. (2006). The endocannabinoid system as an emerging target of pharmacotherapy. *Pharmacological Reviews, 58*(3), 389–462. https://doi.org/10.1124/pr.58.3.2

Palosuo, H., Koskinen, S., Lahelma, E., Prättälä, R., Sihto, M., Keskimäki, I., Martelin, T., Kostiainen, E., Linnanmäki, E., & Talala, K. (2009). Health inequalities in Finland: trends in socioeconomic health differences 1980-2005: summary and conclusions. In H. Palosuo (Ed.), *Health inequalities in Finland* (pp. 217-230). Ministry of Social Affairs and Health.

Pampel, F. C., Boardman, J. D., Daw, J., Stallings, M. C., Smolen, A., Haberstick, B. C., Widaman, K. F., Neppl, T. K., & Conger, R. D. (2015). Life events, genetic susceptibility, and smoking among adolescents. *Social Science Research, 54*, 221–232. https://doi.org/10.1016/j.ssresearch.2015.08.001

Pantic, I. (2014). Online social networking and mental health. *Cyberpsychology, Behavior and Social Networking, 17*(10), 652–657. https://doi.org/10.1089/cyber.2014.0070

Park, A. L., Fuhrer, R., & Quesnel-Vallée, A. (2013). Parents' education and the risk of major depression in early adulthood. *Social Psychiatry and Psychiatric Epidemiology, 48*(11), 1829–1839. https://doi.org/10.1007/s00127-013-0697-8

Parks, M. J., Kingsbury, J. H., Boyle, R. G., & Choi, K. (2017). Behavioral change in response to a statewide tobacco tax increase and differences across socioeconomic status. *Addictive Behaviors, 73*, 209–215. https://doi.org/10.1016/j.addbeh.2017.05.019

Parks, M. J., Solomon, R. J., Solomon, S., Rowland, B. C., Hemphill, S. A., Patton, G. C., & Toumbourou, J. W. (2018). Delinquency, school context, and risk factors in India, Australia, and the United States: Implications for prevention. *Journal of Research on Adolescence, 30*, 143-157. https://doi.org/10.1111/jora.12455

Patel, V., Flisher, A. J., Hetrick, S., & McGorry, P. (2007). Mental health of young people: a global public-health challenge. *The Lancet, 369*(9569), 1302–1313. https://doi.org/10.1016/S0140-6736(07)60368-7

Paternoster, R., & Brame, R. (1997). Multiple routes to delinquency? A test of developmental and general theories of crime. *Criminology, 35*(1), 49–84. https://doi.org/10.1111/j.1745-9125.1997.tb00870.x

Patrick, M. E., Wightman, P., Schoeni, R. F., & Schulenberg, J. E. (2012). Socioeconomic status and substance use among young adults: a comparison across constructs and drugs. *Journal of Studies on Alcohol and Drugs, 73*(5), 772–782. https://doi.org/10.15288/jsad.2012.73.772

Paus, T., Keshavan, M., & Giedd, J. N. (2008). Why do many psychiatric disorders emerge during adolescence? Nature Reviews. *Neuroscience, 9*(12), 947–957. https://doi.org/10.1038/nrn2513

Peeters, M., Cillessen, A. H. N., & Scholte, R. H. J. (2010). Clueless or powerful? Identifying subtypes of bullies in adolescence. *Journal of Youth and Adolescence, 39*(9), 1041–1052. https://doi.org/10.1007/s10964-009-9478-9

Peper, J. S., van den Heuvel, M. P., Mandl, R. C. W., Pol, H. E. H., & van Honk, J. (2011). Sex steroids and connectivity in the human brain: A review of neuroimaging studies. *Psychoneuroendocrinology, 36*(8), 1101–1113. https://doi.org/10.1016/j.psyneuen.2011.05.004

Perlus, J. G., Brooks-Russell, A., Wang, J., & Iannotti, R. J. (2014). Trends in bullying, physical fighting, and weapon carrying among 6th- through 10th-grade students from 1998 to 2010: Findings from a national study. *American Journal of Public Health, 104*(6), 1100–1106. https://doi.org/10.2105/AJPH.2013.301761

Piehler, T. F., & Winters, K. C. (2015). Parental involvement in brief interventions for adolescent marijuana use. *Psychology of Addictive Behaviors, 29*(3), 512–521. https://doi.org/10.1037/adb0000106

Placzek, A. N., Zhang, T. A., & Dani, J. A. (2009). Age dependent nicotinic influences over dopamine neuron synaptic plasticity. *Biochemical Pharmacology, 78*(7), 686–692. https://doi.org/10.1016/j.bcp.2009.05.014

Gorodzeisky, A., & Semyonov, M. (2017). Labor force participation, unemployment and occupational attainment among immigrants in Western European countries. *PloS one, 12*(5), e0176856. https://doi.org/10.1371/journal.pone.0176856

Piha, K., Martikainen, P., Rahkonen, O., Roos, E., & Lahelma, E. (2007). Trends in socioeconomic differences in sickness absence among Finnish municipal employees 1990-99. *Scandinavian Journal of Public Health, 35*(4), 348–55.

Primack, B. A., Douglas, E. L., Land, S. R., Miller, E., & Fine, M. J. (2014). Comparison of media literacy and usual education to prevent tobacco use: a cluster-randomized trial. *The Journal of School Health, 84*(2), 106–115. https://doi.org/10.1111/josh.12130

Punamäki, R.-L., Paavonen, J., Toikka, S., & Solantaus, T. (2013). Effectiveness of preventive family intervention in improving cognitive attributions among children of depressed parents: A randomized study. *Journal of Family Psychology, 27*(4), 683–690. https://doi.org/10.1037/a0033466

Quinn, K., Walsh, J. L., & Dickson-Gomez, J. (2018). Multiple marginality and the variation in delinquency and substance use among adolescent gang members. *Substance Use & Misuse*, 1–16. https://doi.org/10.1080/10826084.2018.1528465

Ragelienė, T. (2016). Links of adolescents identity development and relationship with peers: A systematic literature review. *Journal of the Canadian Academy of Child and Adolescent Psychiatry, 25*(2), 97–105.

Rasmussen, M., Due, P., Damsgaard, M. T., & Holstein, B. E. (2009). Social inequality in adolescent daily smoking: Has it changed over time? *Scandinavian Journal of Public Health, 37*(3), 287–294. https://doi.org/10.1177/1403494809102178

Regidor, E., Ronda, E., Pascual, C., Martínez, D., Calle, M. E., & Domínguez, V. (2006). Decreasing socioeconomic inequalities and increasing health inequalities in Spain: a case study. *American Journal of Public Health, 96*(1), 102–108. https://doi.org/10.2105/AJPH.2004.053983

Reijntjes, A., Kamphuis, J. H., Prinzie, P., & Telch, M. J. (2010). Peer victimization and internalizing problems in children: A meta-analysis of longitudinal studies. *Child Abuse & Neglect, 34*(4), 244–252. https://doi.org/10.1016/j.chiabu.2009.07.009

Richter, M., & Leppin, A. (2007). Trends in socio-economic differences in tobacco smoking among German schoolchildren, 1994–2002. *The European Journal of Public Health, 17*(6), 565–571. https://doi.org/10.1093/eurpub/ckm010

Roberson, A., Renshaw, T. (2018). Structural validity of the HBSC bullying measure: Self-report rating scales of youth victimization and perpetration behavior. *Journal of Psychoeducational Assessment, 36*(6), 628–643. https://doi.org/10.1177/0734282917696932

Robertson, A. A., Dill, P. L., Husain, J., & Undesser, C. (2004). Prevalence of mental illness and substance abuse disorders among incarcerated juvenile offenders in Mississippi. *Child Psychiatry and Human Development, 35*(1), 55–74. https://doi.org/10.1023/b:chud.0000039320.40382.91

Rogers, E. M. (1962). *Diffusion of innovations*. New York: Free Press of Glencoe.

Roh, S. (2018). Scientific evidence for the addictiveness of tobacco and smoking cessation in tobacco litigation. *Journal of Preventive Medicine and Public Health, 51*(1), 1–5. https://doi.org/10.3961/jpmph.16.088

Rollnick, S., & Miller, W. R. (1995). What is motivational interviewing? *Behavioural and Cognitive Psychotherapy, 23*(4), 325–334. https://doi.org/10.1017/S135246580001643X

Rooke, S., Thorsteinsson, E., Karpin, A., Copeland, J., & Allsop, D. (2010). Computer-delivered interventions for alcohol and tobacco use: a meta-analysis. *Addiction, 105*(8), 1381–1390. https://doi.org/10.1111/j.1360-0443.2010.02975.x

Rotko, T., Aho, T., Mustonen, N., & Linnanmäki, E. (2011). *Kapeneeko kuilu? Tilannekatsaus terveyserojen kaventamiseen Suomessa 2007–2010*. Terveyden ja hyvinvoinnin laitos (THL). Raportti 8/2011.

Ruokolainen, O., Heloma, A., Jousilahti, P., Lahti, J., Pentala-Nikulainen, O., Rahkonen, O., & Puska, P. (2019a). Thirty-eight-year trends of educational differences in smoking in Finland. *Internal journal of public health, 64*(6), 853–860. https://doi.org/10.1007/s00038-019-01228-x

Ruokolainen, O., Ollila, H., Lahti, J., & Rahkonen, O. (2019b). Intergenerational social mobility, smoking and smokeless tobacco (snus) use among adolescents during 2008–2017. *Addictive Behaviors, 98*, 106022. https://doi.org/10.1016/J.ADDBEH.2019.06.011

Russell, C., Rueda, S., Room, R., Tyndall, M., & Fischer, B. (2018). Routes of administration for cannabis use – basic prevalence and related health outcomes: A scoping review and synthesis. *International Journal of Drug Policy, 52*, 87–96. https://doi.org/10.1016/j.drugpo.2017.11.008

Russo, E. B., & Marcu, J. (2017). Cannabis pharmacology: The usual suspects and a few promising leads. *Advances in pharmacology, 80*, 67–134. https://doi.org/10.1016/bs.apha.2017.03.004

Saha, S. P., Bhalla, D. K., Whayne, T. F., Gairola, C., & Gairola, C. (2007). Cigarette smoke and adverse health effects: An overview of research trends and future needs. *The International Journal of Angiology, Inc, 16*(3), 77–83. https://doi.org/10.1055/s-0031-1278254

Sailas, E. S., Feodoroff, B., Virkkunen, M., & Wahlbeck, K. (2005). Mental disorders in prison populations aged 15-21: national register study of two cohorts in Finland. *BMJ (Clinical Research Ed.), 330*(7504), 1364–1365. https://doi.org/10.1136/bmj.38415.633762.F7

Salama, E., Niemelä, S., Suvisaari, J., Laatikainen, T., Koponen, P., & Castaneda, A. E. (2018). The prevalence of substance use among Russian, Somali and Kurdish migrants in Finland: a population-based study. *BMC Public Health, 18*(1), 651. https://doi.org/10.1186/s12889-018-5564-9

Salmi, V., Kivivuori, J., & Aaltonen, M. (2015). Correlates of immigrant youth crime in Finland. *European Journal of Criminology, 12*(6), 681–699. doi:10.1177/1477370815587768

Salmivalli, C. (2009). Bullying and the peer group: A review. *Aggression and Violent Behavior, 15*(2), 112–120. https://doi.org/10.1016/j.avb.2009.08.007

Salmivalli, C., & Poskiparta, E. (2012). Making bullying prevention a priority in Finnish schools: The KiVa antibullying program. *New Directions for Youth Development, 2012*(133), 41–53. https://doi.org/10.1002/yd.20006

Salmivalli, C., Voeten, M., & Poskiparta, E. (2011). Bystanders Matter: Associations between reinforcing, defending, and the frequency of bullying behavior in classrooms. *Journal of Clinical Child & Adolescent Psychology, 40*(5), 668–676. https://doi.org/10.1080/15374416.2011.597090

Savioja, H., Helminen, M., Fröjd, S., Marttunen, M., & Kaltiala-Heino, R. (2017). Delinquency and sexual experiences across adolescence: does depression play a role? *The European Journal of Contraception & Reproductive Health Care, 22*(4), 298–304. https://doi.org/10.1080/13625187.2017.1374361

Sawyer, S. M., Azzopardi, P. S., Wickremarathne, D., & Patton, G. C. (2018). The age of adolescence. *The Lancet. Child & Adolescent Health, 2*(3), 223–228. https://doi.org/10.1016/S2352-4642(18)30022-1

Seabrook, E. M., Kern, M. L., & Rickard, N. S. (2016). Social networking sites, depression, and anxiety: A systematic review. *JMIR Mental Health, 3*(4), e50. https://doi.org/10.2196/mental.5842

Selya, A. S., Dierker, L. C., Rose, J. S., Hedeker, D., & Mermelstein, R. J. (2012). Risk factors for adolescent smoking: Parental smoking and the mediating role of nicotine dependence. *Drug and Alcohol Dependence, 124*(3), 311–318. https://doi.org/10.1016/j.drugalcdep.2012.02.004

Seo, H.-J., Jung, Y.-E., Kim, M.-D., & Bahk, W.-M. (2017). Factors associated with bullying victimization among Korean adolescents. *Neuropsychiatric Disease and Treatment, 13*, 2429–2435. https://doi.org/10.2147/NDT.S140535

Shalev, I., Moffitt, T. E., Sugden, K., Williams, B., Houts, R. M., Danese, A., Arseneault, L., & Caspi, A. (2013). Exposure to violence during childhood is associated with telomere erosion from 5 to 10 years of age: a longitudinal study. *Molecular Psychiatry, 18*(5), 576–581. https://doi.org/10.1038/mp.2012.32

Sheffer, C. E., Stitzer, M., Landes, R., Brackman, S. L., Munn, T., & Moore, P. (2012). Socioeconomic disparities in community-based treatment of tobacco dependence. *American Journal of Public Health, 102*(3), e8-16. https://doi.org/10.2105/AJPH.2011.300519

Shetgiri, R., Lin, H., Avila, R. M., & Flores, G. (2012). Parental characteristics associated with bullying perpetration in US children aged 10 to 17 years. *American Journal of Public Health, 102*(12), 2280–2286. https://doi.org/10.2105/AJPH.2012.300725

Sigmund, E., Sigmundová, D., Badura, P., Voráčová, J., Vladimir, H., Jr, Hollein, T., Pavelka, J., Půžová, Z., & Kalman, M. (2020). Time-trends and correlates of obesity in Czech adolescents in relation to family socioeconomic status over a 16-year study period (2002–2018). *BMC Public Health, 20*(1), 229. https://doi.org/10.1186/s12889-020-8336-2

Sigurdson, J. F., Undheim, A. M., Wallander, J. L., Lydersen, S., & Sund, A. M. (2015). The long-term effects of being bullied or a bully in adolescence on externalizing and internalizing mental health problems in adulthood. *Child and Adolescent Psychiatry and Mental Health, 9*(1), 42. https://doi.org/10.1186/s13034-015-0075-2

Sikorska-Jaroszyńska, M. H. J., Mielnik-Błaszczak, M., Krawczyk, D., Nasiłowska-Barud, A., & Błaszczak, J. (2012). Passive smoking as an environmental health risk factor. *Annals of Agricultural and Environmental Medicine, 19*(3), 547–550.

Simpson, C. R., Hippisley-Cox, J., & Sheikh, A. (2010). Trends in the epidemiology of smoking recorded in UK general practice. *The British Journal of General Practice: The Journal of the Royal College of General Practitioners, 60*(572), e121-7. https://doi.org/10.3399/bjgp10X483544

Sleskova, M., Salonna, F., Geckova, A. M., Nagyova, I., Stewart, R. E., van Dijk, J. P., & Groothoff, J. W. (2006). Does parental unemployment affect adolescents' health? *Journal of Adolescent Health, 38*(5), 527–535. https://doi.org/10.1016/j.jadohealth.2005.03.021

Slominski, L., Sameroff, A., Rosenblum, K., & Kasser, T. (2011). Longitudinal predictors of adult socioeconomic attainment: The roles of socioeconomic status, academic competence, and mental health. *Development and Psychopathology, 23*(01), 315–324. doi:10.1017/s0954579410000829

Šmigelskas, K., Vaičiūnas, T., Lukoševičiūtė, J., Malinowska-Cieślik, M., Melkumova, M., Movsesyan, E., & Zaborskis, A. (2018). Sufficient social support as a possible preventive factor against fighting and bullying in school children. *International Journal of Environmental Research and Public Health, 15*(5), 870. https://doi.org/10.3390/ijerph15050870

Smokowski, P. R., & Holland Kopasz, K. (2005). Bullying in school: An overview of types, effects, family characteristics, and intervention strategies. *Children & Schools, 27*(2), 101–110. https://doi.org/10.1093/cs/27.2.101

Solantaus, T., Paavonen, E. J., Toikka, S., & Punamäki, R.-L. (2010). Preventive interventions in families with parental depression: children's psychosocial symptoms and prosocial behaviour. *European Child & Adolescent Psychiatry, 19*(12), 883. https://doi.org/10.1007/S00787-010-0135-3

Sourander, A., Elonheimo, H., Niemelä, S., Nuutila, A.-M., Helenius, H., Sillanmäki, L., Piha, J., Tamminen, T., Kumpulainen, K., Moilanen, I., & Almqvist, F. (2006). Childhood predictors of male criminality: A prospective population-based follow-up study from age 8 to late adolescence. *Journal of the American Academy of Child & Adolescent Psychiatry, 45*(5), 578–586. https://doi.org/10.1097/01.chi.0000205699.58626.b5

Sourander, A, Helstelä, L., Helenius, H., & Piha, J. (2000). Persistence of bullying from childhood to adolescence--a longitudinal 8-year follow-up study. *Child Abuse & Neglect, 24*(7), 873–881. https://doi.org/10.1016/s0145-2134(00)00146-0

Stoner, W. I., & Foley, B. X. (2006). Current tobacco control policy trends in the United States. *Clinics in Occupational and Environmental Medicine, 5*(1), 85–99, ix. https://doi.org/10.1016/j.coem.2005.10.006

Stuart, J., & E. Jose, P. (2014). Is bullying bad for your health? The consequences of bullying perpetration and victimization in childhood on health behaviors in adulthood. *Journal of Aggression, Conflict and Peace Research, 6*(3), 185–195. https://doi.org/10.1108/JACPR-01-2014-0003

Stuckler, D., Basu, S., Suhrcke, M., Coutts, A., & McKee, M. (2011). Effects of the 2008 recession on health: a first look at European data. *Lancet (London, England), 378*(9786), 124–125. https://doi.org/10.1016/S0140-6736(11)61079-9

Sung Hong, J., Lee, J., Espelage, D. L., Hunter, S. C., Upton Patton, D., & Rivers, T. (2016). Understanding the correlates of face-to-face and cyberbullying victimization among U.S. adolescents: A social-ecological analysis. *Violence and Victims, 31*(4), 638–663. https://doi.org/10.1891/0886-6708.VV-D-15-00014

Svensson, R., & Ring, J. (2007). Trends in self-reported youth crime and victimization in Sweden, 1995–2005. *Journal of Scandinavian Studies in Criminology and Crime Prevention, 8*(2), 185–209. https://doi.org/10.1080/14043850701517805

Svrakic, D. M., Lustman, P. J., Mallya, A., Lynn, T. A., Finney, R., & Svrakic, N. M. (2012). Legalization, decriminalization & medicinal use of cannabis: a scientific and public health perspective. *Missouri Medicine, 109*(2), 90–98.

Sweeting, H., & Hunt, K. (2014). Adolescent socio-economic and school-based social status, health and well-being. *Social Science & Medicine (1982)*, 121, 39–47. https://doi.org/10.1016/j.socscimed.2014.09.037

Swift, W., Coffey, C., Carlin, J. B., Degenhardt, L., & Patton, G. C. (2008). Adolescent cannabis users at 24 years: trajectories to regular weekly use and dependence in young adulthood. *Addiction, 103*(8), 1361–1370. https://doi.org/10.1111/j.1360-0443.2008.02246.x

Tait, R. J., Spijkerman, R., & Riper, H. (2013). Internet and computer based interventions for cannabis use: A meta-analysis. *Drug and Alcohol Dependence, 133*(2), 295–304. https://doi.org/10.1016/j.drugalcdep.2013.05.012

Talhout, R., Schulz, T., Florek, E., van Benthem, J., Wester, P., & Opperhuizen, A. (2011). Hazardous compounds in tobacco smoke. *International Journal of Environmental Research and Public Health, 8*(2), 613–628. https://doi.org/10.3390/ijerph8020613

Teplin, L. A., Abram, K. M., McClelland, G. M., Dulcan, M. K., & Mericle, A. A. (2002). Psychiatric disorders in youth in juvenile detention. *Archives of General Psychiatry, 59*(12), 1133–1143. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/12470130

ter Bogt, T. F. M., de Looze, M., Molcho, M., Godeau, E., Hublet, A., Kokkevi, A., Kuntsche, E., Gabhainn, S. N., Franelic, I. P., Simons-Morton, B., Sznitman, S., Vieno, A., Vollebergh, W., & Pickett, W. (2014). Do societal wealth, family affluence and gender account for trends in adolescent cannabis use? A 30 country cross-national study. *Addiction, 109*(2), 273–283. https://doi.org/10.1111/add.12373

Terveyden ja hyvinvoinnin laitos (2019). *Tupakkatilasto 2018*. Tilastoraportti SVT 44/2019. http://urn.fi/URN:NBN:fi-fe2019121046603

Terveyden ja hyvinvoinnin laitos (2019). Differences in life expectancy [web page]. Retrieved January 6, 2020, from https://thl.fi/en/web/health-and-welfare-inequalities/health-care-cervices/differences-in-life-expectancy

Thornberg, R., Tenenbaum, L., Varjas, K., Meyers, J., Jungert, T., & Vanegas, G. (2012). Bystander motivation in bullying incidents: to intervene or not to intervene? *The Western Journal of Emergency Medicine, 13*(3), 247–252. https://doi.org/10.5811/westjem.2012.3.11792

Thornton, R. L., Glover, C. M., Cené, C. W., Gilk, D. C., Henderson, J. A., & Williams, D. R. (2016). Evaluating strategies for reducing health disparities by addressing the social determinants of health. *Health affairs (Project Hope), 35*(8), 1416–1423. https://doi.org/10.1377/hlthaff.2015.1357

Torikka, A., Kaltiala-Heino, R., Luukkaala, T., & Rimpelä, A. (2017). Trends in alcohol use among adolescents from 2000 to 2011: The role of socioeconomic status and depression. *Alcohol and Alcoholism, 52*(1), 95–103. https://doi.org/10.1093/alcalc/agw048

Torikka, A., Kaltiala-Heino, R., Rimpelä, A., Marttunen, M., Luukkaala, T., & Rimpelä, M. (2014). Self-reported depression is increasing among socio-economically disadvantaged adolescents – repeated cross-sectional surveys from Finland from 2000 to 2011. *BMC Public Health, 14*(1), 408. https://doi.org/10.1186/1471-2458-14-408

Turner, H. A., Finkelhor, D., & Ormrod, R. (2007). Family structure variations in patterns and predictors of child victimization. *American Journal of Orthopsychiatry, 77*(2), 282–295. https://doi.org/10.1037/0002-9432.77.2.282

Tzilos, G. K., Reddy, M. K., Caviness, C. M., Anderson, B. J., & Stein, M. D. (2014). Getting higher: co-occurring drug use among marijuana-using emerging adults. *Journal of Addictive Diseases, 33*(3), 202–209. https://doi.org/10.1080/10550887.2014.950024

Underwood, L., & Washington, A. (2016). Mental illness and juvenile offenders. *International Journal of Environmental Research and Public Health, 13*(2), 228. https://doi.org/10.3390/ijerph13020228

Vaillancourt, T., Hymel, S., & Mcdougall, P. (2013). The biological underpinnings of peer victimization: Understanding why and how the effects of bullying can last a lifetime. *Theory Into Practice, 52*, 51–55. https://doi.org/10.1080/00405841.2013.829726

Valtakunnansyyttäjänvirasto (2018). *Seuraamuksen määrääminen huumausaineen käyttörikoksesta*. Yleinen ohje. VKS:2018:2.

van der Heide, I., Wang, J., Droomers, M., Spreeuwenberg, P., Rademakers, & J., Uiters, E. (2013). The relationship between health, education, and health literacy: results from the Dutch Adult Literacy and Life Skills Survey. *Journal of Health Communication, 18*(s1), 172–84. https://doi.org/10.1080/10810730.2013.825668.

van der Heyden, J. H., Demarest, S., Tafforeau, J., & Van Oyen, H. (2003). Socio-economic differences in the utilisation of health services in Belgium. *Health Policy, 65*(2), 153–156. https://doi.org/10.1016/s0168-8510(02)00213-0

Varjonen, V., Tanhua, H., Forsell, M., & Perälä, R. (2012). *Finland – Drug Situation 2012*. National Institute for Health and Welfare (THL). Report 76/2012.

Vieno, A., Lenzi, M., Gini, G., Pozzoli, T., Cavallo, F., & Santinello, M. (2015). Time trends in bullying behavior in Italy. *Journal of School Health, 85*(7), 441–445. https://doi.org/10.1111/josh.12269

Viner, R. M., Ozer, E. M., Denny, S., Marmot, M., Resnick, M., Fatusi, A., & Currie, C. (2012). Adolescence and the social determinants of health. *The Lancet, 379*(9826), 1641–1652. https://doi.org/10.1016/S0140-6736(12)60149-4

Volkow, N. D., Baler, R. D., Compton, W. M., & Weiss, S. R. B. (2014). Adverse health effects of marijuana use. *The New England Journal of Medicine, 370*(23), 2219–2227. https://doi.org/10.1056/NEJMra1402309

von Sydow, K., Lieb, R., Pfister, H., Höfler, M., & Wittchen, H.-U. (2002). What predicts incident use of cannabis and progression to abuse and dependence? A 4-year prospective examination of risk factors in a community sample of adolescents and young adults. *Drug and Alcohol Dependence, 68*(1), 49–64. https://doi.org/10.1016/s0376-8716(02)00102-3

Vuolo, M., & Staff, J. (2013). Parent and child cigarette use: a longitudinal, multigenerational study. *Pediatrics, 132*(3), e568-77. https://doi.org/10.1542/peds.2013-0067

Wallace, J. M., Vaughn, M. G., Bachman, J. G., O'Malley, P. M., Johnston, L. D., Schulenberg, J. E., & Schulenberg, J. E. (2009). Race/ethnicity, socioeconomic factors, and smoking among early adolescent girls in the United States. *Drug and Alcohol Dependence, 104 Suppl 1*(Suppl 1), S42-9. https://doi.org/10.1016/j.drugalcdep.2009.06.007

Wang, J., Iannotti, R. J., & Luk, J. W. (2012). Patterns of adolescent bullying behaviors: physical, verbal, exclusion, rumor, and cyber. *Journal of school psychology, 50*(4), 521–534. https://doi.org/10.1016/j.jsp.2012.03.004

Wang, N., Cao, F., Liu, F., Jia, Y., Wang, J., Bao, C., Wang, X., Song, Q., Tan, B. & Cheng, Y. (2015). The effect of socioeconomic status on health-care delay and treatment of esophageal cancer. *Journal of Translational Medicine, 13*(1), 241. https://doi.org/10.1186/s12967-015-0579-9

Weinberger, A. H., Bandiera, F. C., Leventhal, A. M., Dierker, L. C., Gbedemah, M., Tidey, J. W., & Goodwin, R. D. (2018). Socioeconomic disparities in smoking among U.S. adults with depression, 2005–2014. *American Journal of Preventive Medicine, 54*(6), 765–775. https://doi.org/10.1016/j.amepre.2018.02.008

Weitoft, G. R., Rosén, M., Ericsson, Ö., & Ljung, R. (2008). Education and drug use in Sweden-a nationwide register-based study. *Pharmacoepidemiology and Drug Safety, 17*(10), 1020–1028. https://doi.org/10.1002/pds.1635

Welsh, B. C., Loeber, R., Stevens, B. R., Stouthamer-Loeber, M., Cohen, M. A., & Farrington, D. P. (2008). Costs of juvenile crime in urban areas. *Youth Violence and Juvenile Justice, 6*(1), 3–27. https://doi.org/10.1177/1541204007308427

Welty, L. J., Hershfield, J. A., Abram, K. M., Han, H., Byck, G. R., & Teplin, L. A. (2017). Trajectories of substance use disorder in youth after detention: A 12-year longitudinal study. *Journal of the American Academy of Child & Adolescent Psychiatry, 56*(2), 140–148. https://doi.org/10.1016/j.jaac.2016.10.018

Widome, R., Wall, M. M., Laska, M. N., Eisenberg, M. E., & Neumark-Sztainer, D. (2013). Adolescence to young adulthood: When socioeconomic disparities in substance use emerge. *Substance Use & Misuse, 48*(14), 1522–1529. https://doi.org/10.3109/10826084.2013.800885

Willis, P. E. (1977). *Learning to labour: How working class kids get working class jobs*. Farnborough, England: Saxon House.

Willis, T. A., McNamara, G., Vaccaro, D. (1995). Parental education related to adolescent stress-coping and substance use: Development of a mediational model. *Health Psychology, 14*(5), 464–478. https://doi.org/10.1037//0278-6133.14.5.464

Wolke, D., & Lereya, S. T. (2015). Long-term effects of bullying. *Archives of Disease in Childhood, 100*, 879–885. https://doi.org/10.1136/archdischild-2014-306667

World Health Organization. (1992). *The ICD-10 classification of mental and behavioural disorders: Clinical descriptions and diagnostic guidelines*. Geneva, World Health Organization.

Young, S., Greer, B., & Church, R. (2017). Juvenile delinquency, welfare, justice and therapeutic interventions: a global perspective. *BJPsych Bulletin, 41*(1), 21–29. https://doi.org/10.1192/pb.bp.115.052274

Zhang, S., Benson, T., Deng, X. (2000). A test-retest reliability assessment of the international self-report delinquency instrument. *Journal of Criminal Justice, 28*(4), 283–295. https://doi.org/10.1016/S0047-2352(00)00045-3

Zoccolillo, M., Vitaro, F., & Tremblay, R. E. (1999). Problem drug and alcohol use in a community sample of adolescents. *Journal of the American Academy of Child & Adolescent Psychiatry, 38*(7), 900–907. https://doi.org/10.1097/00004583-199907000-00021

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Socioeconomic trends in school bullying among Finnish adolescents from 2000 to 2015

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ABSTRACT

Bullying at school has far-reaching impacts on adolescent well-being and health. The aim of this study was to examine trends in bullying at school according to socioeconomic adversities among Finnish adolescents from 2000 to 2015. A population-based school survey was conducted biennially among 14–16-year-old Finns between 2000 and 2015 (n = 761,278). Distributions for bullying, being bullied and socioeconomic adversities were calculated. Associations between bullying involvement, time and socioeconomic adversities were studied using binomial logistic regression with results shown by odds ratios with 95% confidence intervals. At the population level, the likelihoods of bullying and being bullied varied only slightly between 2000 and 2015. Bullying and being bullied were associated with socioeconomic adversities (low parental education, not living with both parents and parental unemployment in the past year). Unlike in the general population, the likelihoods of bullying and being bullied increased markedly among adolescents with most socioeconomic adversities. The increased socioeconomic differences in bullying involvement observed in this study add to the mounting evidence of polarization of adolescent health and well-being. Socioeconomic adversities should be considered in the prevention of bullying at school. In addition, socio-political measures are needed to decrease socioeconomic inequalities among Finnish adolescents.

1. Introduction

Bullying is defined as intentional harm-doing that is carried out repeatedly over time and involves a power imbalance between perpetrator and victim (Olweus, 1994). According to the WHO survey Health Behavior in School-aged Children involving 40 European countries, 26% of all young people reported having been involved in bullying during the past two months (Craig et al., 2009). In recent decades, the prevalences of bullying and being bullied have remained the same or even decreased in many European and North American countries (Chester et al., 2015; Cooc & Gee, 2014a; Finkelhor et al., 2014; Molcho et al., 2009; Perlus, Brooks-Russell, Wang, & Iannotti, 2014; Vieno et al., 2015). This study aims to examine socioeconomic trends in bullying at school among

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Finnish adolescents between 2000 and 2015.

Bullying at school is a significant cause of psychological, physical and social suffering. Bullying victimization is a major risk factors of mental health disorders, such as depression, anxiety disorders and substance use problems (Kaltiala-Heino, Fröjd, & Marttunen, 2009; Reijntjes, Kamphuis, Prinzie, & Telch, 2010). Also bullying perpetration is associated with the development of mental health problems, such as personality disorders (Copeland, Wolke, Angold, & Costello, 2013; Kaltiala-Heino et al., 2009). Both victims and perpetrators of bullying suffer from physical health problems, such as headaches and accidental injuries, more than adolescents not involved in bullying (Srabstein, McCarter, Shao, & Huang, 2006). In addition, bullying perpetration also predicts criminality later in adolescence (Barker, Arseneault et al., 2008).

Some risk factors for bullying have been identified in the scientific literature. Boys are more often involved than girls in bullying both as perpetrators (de Oliveira et al., 2016; Jansen, Veenstra, Ormel, Verhulst, & Reijneveld, 2011; Vieno et al., 2015) and victims (Aho, Gren-Landell, & Svedin, 2016; Cooc & Gee, 2014b; de Oliveira et al., 2015; Due, Damsgaard et al., 2009; Due, Merlo et al., 2009; Hong et al., 2016; Menrath et al., 2015; Nordhagen, Nielsen, Stigum, & Kohler, 2005; Vieno et al., 2015). Age and developmental stage are associated with the means of bullying: physical bullying is most often seen among young children, whereas verbal bullying becomes more common along with the development of verbal skills. As social skills improve and socialization proceeds, the more subtle indirect forms of bullying become dominant. (Bjorkqvist, Österman, & Kaukiainen, 1992)

In addition to sex and age, socioeconomic status (SES) has been examined as a risk factor for bullying involvement. SES is an aggregate concept comprising resource-based (such as material and social resources) and prestige-based (individual's rank or status) indicators of socioeconomic position, which can be measured at both individual, household, and neighborhood levels (Krieger, Williams, & Moss, 1997). It can be assessed through individual measures, such as education, income, or occupation (Galobardes, Shaw, Lawlor, Lynch, & Davey Smith, 2006a, Galobardes, Shaw, Lawlor, Lynch, & Davey Smith, 2006b), but also through composite measures that provide an overall index of socioeconomic level. Of the SES indicators, low parental education has been associated with bullying perpetration and victimization in several studies (de Oliveira et al., 2015; Jansen et al., 2011, 2012; Nordhagen et al., 2005). Living with both parents, on the other hand, has been observed to protect adolescents against bullying involvement (Aho et al., 2016; Jablonska & Lindberg, 2007; Nordhagen et al., 2005), whereas living in a single-parent family or a blended family have been observed to be risk factors for bullying involvement (Jablonska & Lindberg, 2007; Nordhagen et al., 2005). In addition, parental unemployment has been associated with bullying victimization (Delfabbro et al., 2006). However, not all studies observed the association between SES and bullying involvement, and the scientific evidence is stronger on the association between SES and bullying victimization than SES and bullying perpetration (Tippett & Wolke, 2014). The results vary according to how SES is measured, and there is no consensus over whether single SES indicators or an overall index of SES is associated with bullying involvement.

Socioeconomic disparities have increased in many countries around the world in recent decades (Keraudren & Rizzo, 2010; Rotko, Aho, Mustonen, & Linnanmäki, 2007). The Nordic countries, including Finland, have traditionally been considered to be welfare states where socioeconomic inequalities are minimal. However, in the past decades, socioeconomic disparities have increased in Finland as well: for instance, child poverty has tripled from 1995 to 2008 (Rotko et al., 2007). Scientific evidence suggests that socioeconomic disparities have also increased in the area of adolescent health and well-being: Frederick, Snellman, and Putnam, (2014) found that socioeconomic disparities in the prevalence of overweight have increased among adolescents in the US since 2002. Torikka et al. (2014, 2017) observed that the differences in the prevalences of depression, heavy drinking and drunkenness between socioeconomic groups increased among Finnish adolescents from 2000 to 2011. Therefore it can be hypothesized that socioeconomic inequalities have increased in bullying involvement as well. However, no studies have so far been conducted on the subject. The aim of this study was to examine trends in bullying at school among Finnish adolescents between 2000 and 2015 and differences in these trends according to the socioeconomic adversities. Our research questions were:

(1) Did the prevalences of bullying and being bullied change between 2000 and 2015?
(2) Are bullying and being bullied at school associated with socioeconomic adversities (low parental education, not living with both parents and parental unemployment)?
(3) Did the trends in bullying and being bullied at school differ according to the socioeconomic adversities?

2. Methods

2.1. Data and participants

The School Health Promotion Study of the National Institute for Health and Welfare is a survey that examines the health, health behavior and school experiences of Finnish adolescents. The survey has been conducted biennially since 1996 among 8th and 9th graders with pooled 2-year-data (2000–2001, 2002–2003, 2004–2005, 2006–2007, 2008–2009, 2010–2011, 2012–2013, 2014–2015). The data was collected anonymously during a school lesson under the supervision of a teacher, who did not interfere with the responses. Participants were informed about the voluntary nature of the study in both oral and written form, and returning the survey was considered consent to participate. The survey took about 30–45 min to complete. After this, the surveys were put in an envelope, sealed and returned directly to the research center. The timing of the study, sampling and data collection methods were held constant in each survey. More information on the study is included in the Appendix A. Altogether, 761,278 (50,404–109,127 biennially) 8th and 9th graders participated in the survey. The 8th graders were 14–15 years old and the 9th graders 15–16 years old at the time of the surveys. The biennial cohorts covered between 43–82% of the whole age cohort of the country. This study was

approved by the ethics committee of Pirkanmaa Hospital District and the National Institute of Health and Welfare.

2.2. Data collection tool

The questionnaire contained the following brief definition of bullying: 'In this questionnaire, bullying refers to the harassment of one pupil by another pupil or a group of pupils either verbally or physically. Teasing a pupil repeatedly in ways he or she does not like is also considered bullying. An argument between two roughly equal pupils is not considered bullying.' Bullying and being bullied were elicited using two questions derived from a World Health Organization study on youth health (King, Wold, Tudor-Smith, & Harel, 1996): 'How often have you been bullied at school in this SEMESTER?' and 'How often have you participated in bullying other students in this SEMESTER?' The response alternatives were 'several times a week', 'about once a week', 'less frequently' and 'not at all. These bullying victimization and perpetration measures have been shown to possess good validity and reliability for measuring bullying involvement (Roberson & Renshaw, 2017). For the analyses, two dichotomized bullying involvement variables 'frequently bullying others' and 'frequently bullied' were created, in which the response alternatives 'several times a week' and 'about once a week' were considered frequent bullying involvement.

The socioeconomic variables recorded were sex, parental education, parental unemployment in the past year and family structure. Parental education was elicited as follows: 'What is the highest education qualification your father/mother has achieved?' The response options in the 2000 questionnaire were 'basic school/vocational school/high school and/or vocational school/university or polytechnic'. The response options varied slightly over time: for instance, in the 2013 questionnaire there was a response option 'no education', which was removed from the 2015 questionnaire. For the analyses, parental education was dichotomized as parental basic education only (including the response option 'no education') versus other. Parental unemployment was elicited as follows: 'Have your parents been unemployed or laid off work during the past YEAR?' The response options were the same in all questionnaires: 'neither/one parent/both parents'. Family structure was elicited as follows: 'My famiily consists of…' The response options in the 2000 questionnaire were 'mother and father/mother and stepfather/father and stepmother/mother only/father only/spouse/other caregiver'. The response options varied slightly over time. For the analyses, family structure was dichotomized as living with both parents – always included as the first response option – versus other. In this article, all three variables are referred to as socioeconomic adversities. In addition, a variable 'cumulative socioeconomic adversity' was created, in which all three socioeconomic variables were combined, with a score of 0 indicating no socioeconomic adversities (living with both parents, no parental unemployment and at least one parent with higher than basic education) and a score of 4 stood for having all socioeconomic adversities studied (not living with both parents, both parents unemployed, both parents with basic education only).

2.3. Statistical analysis

All statistical analyses were conducted using the SPSS software (version 24). Distributions of bullying involvement and socioeconomic adversities for both sexes during the time period 2000–2015 are presented in Table 1. Bivariate associations were studied using binomial logistic regression with the results shown as odds ratios with 95% confidence intervals. Frequent bullying

Table 1
Involvement in bullying at school and socioeconomic characteristics among Finnish boys and girls in the 8th and 9th grades of comprehensive school (%).

	Boys (n = 381,527)	Girls (n = 376,814)	p
Age (mean (sd))	15.4 (0.7)	15.3 (0.6)	< 0.001
Frequently bullied	8.6	5.9	< 0.001
Yes	90.8	93.8	
No	0.5	0.3	
Missing[a]			
Frequently bullying others	9.4	2.8	< 0.001
Yes	90.1	96.9	
No	0.5	0.3	
Missing[a]			
Lives with both parents	74.4	73.7	< 0.001
Yes	23.3	25.1	
No	2.3	1.2	
Missing[a]			
Both parents only basic education	5.6	5.9	< 0.001
Yes	86.8	87.5	
No	7.6	6.6	
Missing[a]			
Parental unemployment past year	70.9	69.9	< 0.001
No	23.6	25.6	
One parent	3.2	3.3	
Both parents	2.3	1.2	
Missing[a]			

[a] 'Missing' = No information was received on this question.

Table 2
Involvement in bullying at school over time among Finnish boys and girls in the 8th and 9th grades of comprehensive school. (OR (95% CI))[a].

	2002–2003	2004–2005	2006–2007	2008–2009	2010–2011	2012–2013	2014–2015
BOYS							
Frequently bullied	1.1 (1.1–1.2)	1.2 (1.1–1.2)	1.3 (1.2–1.3)	1.4 (1.3–1.4)	1.5 (1.4–1.5)	1.3 (1.2–1.3)	1.1 (1.0–1.1)
Frequently bullying others	1.0 (0.9–1.0)	0.9 (0.9–1.0)	1.0 (1.0–1.0)	1.1 (1.1–1.2)	1.0 (1.0–1.1)	0.6 (0.6–0.7)	0.6 (0.5–0.6)
GIRLS							
Frequently bullied	1.0 (0.9–1.1)	1.0 (1.0–1.1)	1.1 (1.0–1.2)	1.1 (1.1–1.2)	1.3 (1.2–1.4)	1.3 (1.2–1.4)	1.2 (1.1–1.3)
Frequently bullying others	1.0 (1.0–1.1)	1.0 (1.0–1.1)	1.1 (1.1–1.2)	1.4 (1.3–1.5)	1.4 (1.3–1.5)	0.7 (0.7–0.8)	0.5 (0.5–0.6)

[a] Time period 2000–2001 used as a reference category.

victimization and perpetration were entered as dependent variables. In the first model, categorical time periods (2000–2001, 2002–2003, 2004–2005, 2006–2007, 2008–2009, 2010–2011, 2012–2013, 2014–2015) were entered as an independent factor using the time period 2000–2001 as a reference category (Table 2). In the second model, family structure (living with both parents/other), parental unemployment in the past year (neither/one parent/both parents) and parental education (both parents basic education only/other) were entered one at a time, each as an independent factor (Table 4). In the third model, cumulative socioeconomic adversity was entered as an independent factor and associations were calculated separately for each time period (Tables 5 and 6).

3. Results

The overall prevalence of being frequently bullied was 5.9% for girls and 8.6% for boys; the prevalence of frequently bullying others was 2.8% for girls and 9.4% for boys (Table 1). The prevalences of being frequently bullied and frequently bullying others varied only slightly over time: they remained at the same level or slightly above the level in 2000–2001, except for frequently bullying others, which decreased below the 2000–2001 level since 2012–2013 for both sexes (Table 2).

The proportion of adolescents not living with both parents increased towards the end of the study. The proportion of low parental education and parental unemployment varied only slightly over time. (Table 3) Both being frequently bullied and frequently bullying others were more common among girls and boys not living with both parents than among those who did. Being frequently bullied and frequently bullying others were also positively associated with parental unemployment. Involvement in bullying at school was most common among girls and boys whose both parents had been unemployed and least common among those whose parents had not been

Table 3
Proportion of socioeconomic adversities over time among Finnish boys and girls in the 8th and 9th grades of comprehensive school. (%).

	2000–2001	2002–2003	2004–2005	2006–2007	2008–2009	2010–2011	2012–2013	2014–2015
BOYS								
Not living with both parents	21.5	21.0	21.9	21.9	21.8	20.7	30.1	31.9
Yes	75.5	76.8	76.4	76.2	76.3	77.6	66.1	65.5
No	3.1	2.2	1.7	1.9	1.9	1.6	3.8	2.6
Missing[a]								
Both parents low education	8.0	6.8	5.7	4.8	3.7	5.8	5.2	4.6
Yes	83.2	86.4	87.5	87.8	88.4	88.0	84.1	89.7
No	8.8	6.8	6.8	7.4	7.8	6.2	10.7	5.7
Missing[a]								
Parental unemloyment	66.5	70.9	72.4	75.7	73.0	68.8	70.1	66.3
No	26.4	23.4	22.7	19.6	22.0	26.1	24.1	26.8
One parent	3.9	3.2	2.9	2.6	3.0	3.6	3.2	3.9
Both parents	3.1	2.5	2.0	2.1	2.0	1.6	2.6	3.0
Missing[a]								
GIRLS								
Not living with both parents	22.9	22.9	23.8	23.8	23.4	22.3	32.2	33.4
Yes	98.4	75.8	75.2	75.2	75.5	76.8	65.8	65.8
No	1.6	1.3	0.9	1.0	1.1	0.9	2.1	0.8
Missing[a]								
Both parents low education	8.6	6.9	5.9	5.1	3.9	7.1	5.3	3.9
No	82.7	86.3	88.1	88.8	89.5	87.3	86.5	92.4
Yes	8.7	6.8	6.0	6.2	6.6	5.6	8.2	3.7
Missing[a]								
Parental unemloyment	65.8	69.8	71.0	74.7	72.2	67.6	69.4	65.6
No	28.3	25.4	24.9	21.7	23.8	27.7	26.1	29.3
One parent	4.3	3.3	3.0	2.5	2.8	3.7	3.2	3.9
Both parents	1.6	1.4	1.1	1.1	1.1	0.9	1.3	1.2
Missing[a]								

[a] 'Missing' = No information was received on this question.

Table 4
Involvement in bullying at school by socioeconomic adversities among Finnish boys and girls in the 8th and 9th grades of comprehensive school. (OR (95% CI)).

	Frequently bullied	Frequently bullying others
BOYS	Ref[a]	Ref[a]
Family structure		
Both parents		
Not living with both parents	1.4 (1.3–1.4)	1.5 (1.5–1.6)
Both parents with low education	Ref[a]	Ref[a]
No	1.6 (1.5–1.7)	1.7 (1.6–1.8)
Yes		
Parental unemployment	Ref[a]	Ref[a]
Neither parent	1.3 (1.3–1.3)	1.3 (1.2–1.3)
One parent	2.8 (2.7–3.0)	3.1 (2.9–3.2)
Both parents		
GIRLS		
Family structure	Ref[a]	Ref[a]
Both parents	1.5 (1.4–1.5)	1.7 (1.7–1.8)
Not living with both parents		
Both parents with low education	Ref[a]	Ref[a]
No	1.6 (1.5–1.7)	1.8 (1.7–2.0)
Yes		
Parental unemployment	Ref[a]	Ref[a]
Neither parent	1.4 (1.4–1.5)	1.4 (1.3–1.5)
One parent	2.6 (2.4–2.7)	3.4 (3.2–3.7)
Both parents		

[a] 'Ref' = reference category.

unemployed in the past year. Involvement in bullying at school was also more common when both parents had only basic education than when at least one parent had higher than basic education. (Table 4)

Differences in the prevalence of involvement in bullying at school according to cumulative socioeconomic adversity increased markedly among both sexes over the entire study period (Tables 5 and 6). The difference in being frequently bullied between girls not living with both parents, with both parents unemployed, and with parents having basic education only, and girls living with both parents, with no parental unemployment, and at least one parent with higher than basic education increased from 2000–2001 (OR = 4.1, 95% CI 2.3–7.5) to 2015–2014 (OR = 19.3, 95% CI 12.6–29.5). Similarly for boys, the difference in being frequently bullied increased from 2000–2001 (OR = 7.6, 95% CI 5.1–11.3) to 2014–2015 (OR = 18.1, 95% CI 13.5–24.3). In addition, the difference in frequently bullying others increased both for girls (OR = 8.6, 95% CI 4.7–15.6 in 2000–2001; OR = 76.6, 95% CI 47.2–124.4 in 2014–2015) and for boys (OR = 6.3, 95% CI 4.2–9.2 in 2000–2001; OR = 27.6, 95% CI 20.5–37.2 in 2014–2015).

4. Discussion

In this study, we observed that involvement in bullying at school, both as a victim and as a perpetrator, was associated with

Table 5
Being frequently bullied over time by cumulative socioeconomic adversity among Finnish boys and girls in the 8th and 9th grades of comprehensive school. (OR (95% CI))[a,b].

	2000–2001	2002–2003	2004–2005	2006–2007	2008–2009	2010–2011	2012–2013	2014–2015
BOYS								
Number of sociodemographic adversities								
1	1.3 (1.2–1.4)	1.2 (1.1–1.3)	1.2 (1.2–1.3)	1.3 (1.2–1.4)	1.3 (1.2–1.3)	1.3 (1.2–1.4)	1.3 (1.2–1.4)	1.5 (1.3–1.7)
2	1.5 (1.3–1.7)	1.5 (1.4–1.7)	1.6 (1.4–1.7)	1.8 (1.7–2.0)	1.8 (1.6–2.0)	1.7 (1.5–1.8)	1.6 (1.5–1.8)	2.1 (1.9–2.5)
3	2.9 (2.4–3.4)	2.0 (1.6–2.4)	2.5 (2.1–3.0)	3.5 (2.9–4.2)	2.5 (2.1–3.1)	2.5 (2.1–3.0)	2.5 (2.0–3.0)	4.8 (3.8–6.1)
4	7.6 (5.1–11.3)	7.4 (5.2–10.7)	8.9 (6.2–12.9)	8.6 (6.1–12.3)	8.4 (6.0–11.8)	9.9 (7.3–13.4)	12.1 (9.2–15.8)	18.1 (13.5–24.3)
GIRLS								
Number of sociodemographic adversities								
1	1.3 (1.2–1.4)	1.5 (1.4–1.7)	1.4 (1.3–1.5)	1.5 (1.4–1.7)	1.4 (1.3–1.5)	1.3 (1.2–1.5)	1.4 (1.2–1.5)	1.3 (1.1–1.4)
2	1.7 (1.5–1.9)	1.7 (1.5–1.9)	1.7 (1.6–2.0)	2.0 (1.8–2.2)	1.8 (1.6–2.0)	1.7 (1.6–1.9)	2.0 (1.8–2.2)	1.9 (1.6–2.3)
3	2.1 (1.7–2.7)	2.9 (2.4–3.6)	2.7 (2.2–3.4)	3.0 (2.4–3.7)	2.3 (1.8–2.9)	2.6 (2.1–3.1)	2.6 (2.1–3.2)	2.1 (1.5–2.8)
4	4.1 (2.3–7.5)	4.1 (2.3–7.3)	10.2 (6.5–16.0)	9.9 (6.4–15.2)	9.9 (6.6–14.9)	15.1 (11-1–20.7)	9.2 (6.6–12.8)	19.3 (12.6–29.5)

[a] Socioeconomic adversities: low parental education, not living with both parents and parental unemployment in the past year (one or both parents).

[b] Adolescents in the same time period living with both parents, with at least one parent with higher than basic education and both parents employed used as a reference category.

Table 6
Frequently bullying others over time by cumulative socioeconomic adversity among Finnish boys and girls in the 8th and 9th grades of comprehensive school. (OR (95% CI))[a,b].

	2000–2001	2002–2003	2004–2005	2006–2007	2008–2009	2010–2011	2012–2013	2014–2015
BOYS								
Number of sociodemographic adversities								
1	1.3 (1.2–1.3)	1.3 (1.2–1.4)	1.3 (1.2–1.4)	1.3 (1.2–1.4)	1.2 (1.2–1.3)	1.3 (1.2–1.4)	1.4 (1.3–1.5)	1.3 (1.1–1.5)
2	1.7 (1.5–1.8)	1.7 (1.5–1.8)	1.6 (1.5–1.8)	1.9 (1.8–2.1)	1.8 (1.7–2.0)	1.9 (1.8–2.1)	2.0 (1.7–2.2)	1.9 (1.7–2.3)
3	3.0 (2.5–3.6)	2.7 (2.3–3.2)	3.3 (2.8–3.9)	3.5 (3.0–4.2)	2.9 (2.4–3.5)	3.1 (2.6–3.7)	3.3 (2.7–4.1)	4.6 (3.6–5.9)
4	6.3 (4.2–9.2)	10.1 (7.1–14.3)	9.9 (6.8–14.2)	11.9 (8.4–16.9)	13.7 (9.8–19.1)	13.5 (10.1–18.3)	16.7 (12.7–21.9)	27.6 (20.5–37.2)
GIRLS								
Number of sociodemographic adversities								
1	1.3 (1.1–1.5)	1.5 (1.3–1.7)	1.6 (1.4–1.8)	1.4 (1.3–1.6)	1.6 (1.4–1.7)	1.4 (1.2–1.5)	1.4 (1.2–1.7)	2.0 (1.5–2.7)
2	1.8 (1.5–2.1)	2.2 (1.9–2.6)	1.9 (1.6–2.3)	2.0 (1.7–2.3)	2.2 (1.9–2.5)	2.1 (1.8–2.4)	2.0 (1.7–2.5)	2.5 (1.8–3.5)
3	2.6 (1.9–3.5)	3.6 (2.8–4.7)	3.2 (2.4–4.3)	3.5 (2.7–4.7)	3.4 (2.7–4.5)	3.5 (2.8–4.4)	3.6 (2.7–4.9)	4.4 (2.7–7.2)
4	8.6 (4.7–15.6)	8.0 (4.4–14.5	28.4 (18.3–44.2)	22.8 (14.9–34.8)	22.4 (14.9–33.6)	23.5 (17.0–32.4)	25.7 (17.8–37.0)	76.6 (47.2–124.4)

[a] Socioeconomic adversities: low parental education, not living with both parents and parental unemployment in the past year (one or both parents).
[b] Adolescents in the same time period living with both parents, with at least one parent with higher than basic education and both parents employed used as a reference category.

socioeconomic adversities among 14–16-year-old Finnish adolescents. Frequent subjection to bullying and being bullied at school were more common among adolescents not living with both parents than among those who did. Bullying and being bullied were also positively associated with parental unemployment in the past year and were more common among adolescents whose parents had only basic education than among those with at least one parent with higher than basic education. The most important, and novel, finding was that although the overall prevalences of bullying and being bullied did not change markedly over the study period, among those with the most socioeconomic adversities, they increased significantly.

Bullying and being bullied were more common among adolescents not living with both parents than among those in intact families. The result is in line with previous studies (Aho et al., 2016; Jablonska & Lindberg, 2007; Jansen et al., 2011, 2012; Nordhagen et al., 2005; Turner, Finkelhor, & Ormrod, 2007). According to a North American meta-analysis (Amato & Keith, 1991), the rates of conduct problems and difficulties with psychological adaptation are higher among children of divorced parents than among those of non-divorced parents. Similarly, the rates of psychological problems are higher among adolescents living in step-families than those living in intact families, although the individual variation is considerable (Amato, 1994). Bullying perpetration can be a manifestation of a conduct disorder or an externalizing symptom itself (WHO, 1992). On the other hand, externalizing and internalizing problems have been shown to predict bullying victimization (Boulton & Smith, 1994; Fekkes, Pijpers, Fredriks, Vogels, & Verloove-Vanhorick, 2006; Hodges & Perry, 1999; Sourander, Helstelä, Helenius, & Piha, 2000). In addition, single parents have less time and financial resources than co-habiting parents in general, which can partly explain the increased likelihood of bullying involvement among children of single parents (Barker, Boivin et al., 2008; Barker, Arseneault et al., 2008; Due, Damsgaard et al., 2009; Due, Merlo et al., 2009; Hong et al., 2016; Schumann, Craig, & Rosu, 2014; Shetgiri, 2013; Shetgiri, Lin, Avila, & Flores, 2012).

Bullying victimization and perpetration were more common among adolescents whose parents had only basic education than among those with at least one parent with higher than basic education. Similar observations have been made in earlier studies (de Oliveira et al., 2015; Fu, Land, & Lamb, 2013; Jansen et al., 2011, 2012; Nordhagen et al., 2005). Parental education reflects informational and financial resources, values, norms and problem-solving skills in the family (Braveman et al., 2005; Galobardes et al., 2006a, 2006b). Bullying and being bullied were also more common the more parental unemployment there had been in the family in the past year. The finding is in line with in previous studies (Magklara et al., 2012; Stalmach, Tabak, & Radiukiewicz, 2014). Parental unemployment is associated with economic hardship in the family, parental stress, and adolescent psychosocial problems (Kim & Hagquist, 2017), (Bau, m, Fleming, & Reddy, 1986), which are risk factors of bullying involvement (Alizadeh Maralani, Mirnasab, & Hashemi, 2016; Barker, Boivin et al., 2008; Boulton & Smith, 1994; Due, Damsgaard et al., 2009; Fekkes et al., 2006; Garaigordobil & Machimbarrena, 2017; Hodges & Perry, 1999; Hong et al., 2016; Schumann et al., 2014; Sourander et al., 2000).

The more socioeconomic adversities an adolescent had, the more likely they were to be either bullies or victims. But above all, the gap in bullying involvement between adolescents with most and least socioeconomic adversities increased significantly from 2000 to 2015. To our knowledge, this is the first study to examine differences in trends in bullying at school according to the socioeconomic adversities. Torikka et al. (2014, 2017) observed similarly that socioeconomic differences in depression and alcohol consumption increased among Finnish adolescents from 2000 to 2011. These differences reflect a more pervasive phenomenon in society: although the overall level of health and well-being has constantly risen, this increase has not been evenly distributed among the population. Socioeconomic health disparities among adolescents have also increased in many other European and North American countries in the past few decades (Elgar et al., 2015). The causes of increased socioeconomic disparities are multidimensional and not completely known. Since the economic depression in the 1990s, the economic development of the lowest income group has lagged behind other income groups. Additionally, the purchasing power of welfare benefits has decreased (Moisio, 2009). The association between socioeconomic status and health is mediated by health-related behavior, living conditions, and the consumption of health services (Palosuo, Koskinen, Lahelma, & Prättälä, 2007). In addition to causing individual suffering, socioeconomic health disparities are a

major burden on public health and economy (Koskinen, Seppo, & Martelin, 2007).

The causes of socioeconomic health disparities are rooted in society, and therefore socio-political decision-making plays a major role in decreasing them. Ensuring everyone's right to adequate social security, education, work, and social and health services are important ways to decrease socioeconomic disparities in health and well-being, including bullying at school. Reducing socioeconomic health disparities decreases overall suffering, helps to ensure the adequacy of public services and is also cost-effective (Rotko et al., 2007).

5. Limitations

This study has several strengths. It was based on uniquely large and nationally representative data large enough for analysing time trends (n = 761,278) in health and behavioral outcomes. The school sample of this age group was comprehensive as basic education is compulsory for everyone under the age of 16 in Finland. To our knowledge, no corresponding material can be found elsewhere. The sampling and timing of the study were held constant over the study years, likewise the elicitation of bullying and being bullied at school.

This study has also some limitations. Self-report data is susceptible to errors, such as recall bias and invalid responding. Parental education especially may be difficult for an adolescent to recall, which may have caused the proportion of missing responses to that question to be higher than on other questions. However, the proportions of missing responses to all questions were small. Invalid responding is another source of error in studies relying on self-report data. Social desirablility may result in too low reporting of problem behaviors (Fisher and Katz, 2008), and adolescents may also find it funny to exaggerate their symptoms and problem behaviors in survey studies (Robinson-Cimpian, 2014). Such influences on bullying involvement were not controlled for in this study, but there is no reason to assume that either social desirability or exaggerating problems would have a biasing effect on the trends.

6. Conclusion

Socioeconomic disparities in bullying at school increased among Finnish adolescents from 2000 to 2015. Although the overall likelihoods of bullying and victimization did not change markedly, they increased significantly among adolescents with most socioeconomic adversities. Socioeconomic adversities should be considered in the prevention of bullying at school. In addition, socio-political actions are needed to decrease socioeconomic inequalities among Finnish adolescents.

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Appendix A. The School Health Promotion Study

The School Health Promotion (SHP) study monitors the well-being, health and school work of Finnish children and adolescents. The aim of the SHP study is to strengthen the planning and evaluation of health promotion activities at school, municipal and national levels.

The SHP study is carried out nationwide every second year in March–April. The data are gathered by an anonymous and voluntary classroom-administered questionnaire. The topics of the questionnaire are living conditions, school work, health, health-related behaviour and school health services. The questionnaire is continuously being developed. Still, most of the questions have remained the same for almost 20 years, so as to maintain comparability.

Table A1

Table A1
The School Health Promotion Study Questionnaire: Categories in 2000–2001[†].

Demographics
School and schoolwork
Bullying at school
Health
Mental health
Health education
Sexual health
Smoking
Parental smoking
Alcohol and substance use
Leisure time
Nutrition
Delinquent behavior
Family and friends
Health claims

[†] The categories varied a little across years.

References

Aho, N., Gren-Landell, M., & Svedin, C. G. (2016). The prevalence of potentially victimizing events, poly-victimization, and its association to sociodemographic factors: A swedish youth survey. *Journal of Interpersonal Violence, 31*(4), 620–651. https://doi.org/10.1177/0886260514556105.

Alizadeh Maralani, F., Mirnasab, M., & Hashemi, T. (2016). The predictive role of maternal parenting and stress on pupils' bullying involvement. *Journal of Interpersonal Violence*. https://doi.org/10.1177/0886260516672053 88626051667205.

Amato, P. (1994). The implications of research findings on children in stepfamilies. In J. Booth, Alan, & Dunn (Eds.). *Stepfamilies: Who benefits? Who does not?*. Hillsdale NJ: Erlbaum.

Amato, P., & Keith, B. (1991). Parental divorce and the well-being of children: A meta-analysis. *Psychological Bulletin, 110*(1), 26–46. https://doi.org/10.1037/0033-2909.110.1.26.

Barker, E. D., Arseneault, L., Brendgen, M., Fontaine, N., & Maughan, B. (2008). Joint development of bullying and victimization in adolescence: Relations to delinquency and self-harm. *Journal of the American Academy of Child and Adolescent Psychiatry, 47*(9), 1030–1038. https://doi.org/10.1097/CHI.ObO13e31817eec98.

Barker, E. D., Boivin, M., Brendgen, M., Fontaine, N., Arseneault, L., Vitaro, F., ... Tremblay, R. E. (2008). Predictive validity and early predictors of peer-victimization trajectories in Preschool. *Archives of General Psychiatry, 65*(10), 1185. https://doi.org/10.1001/archpsyc.65.10.1185.

Baum, A., Fleming, R., & Reddy, D. M. (1986). Unemployment stress: Loss of control, reactance and learned helplessness. *Social Science & Medicine (1982), 22*(5), 509–516. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/3704688.

Bjorkqvist, K., Österman, K., & Kaukiainen, A. (1992). *The development of direct and indirect aggressive strategies in males and females. In of mice and women: Aspects of female aggression.* Retrieved from51–64. https://www.researchgate.net/profile/Kaj_Bjoerkqvist/publication/307981817_The_development_of_direct_and_indirect_aggressive_strategies_in_males_and_females/links/57e2578b08ae9e25307f10c2/The-development-of-direct-and-indirect-aggressive-strategies-in-mal.

Boulton, M. J., & Smith, P. K. (1994). Bully/victim problems in middle-school children: Stability, self-perceived competence, peer perceptions and peer acceptance. *The British Journal of Developmental Psychology, 12*(3), 315–329. https://doi.org/10.1111/j.2044-835X.1994.tb00637.x.

Braveman, P. A., Cubbin, C., Egerter, S., Chideya, S., Marchi, K. S., Metzler, M., ... Posner, S. (2005). Socioeconomic status in health research. *JAMA, 294*(22), 2879. https://doi.org/10.1001/jama.294.22.2879.

Chester, K. L., Callaghan, M., Cosma, A., Donnelly, P., Craig, W., Walsh, S., ... Molcho, M. (2015). Cross-national time trends in bullying victimization in 33 countries among children aged 11, 13 and 15 from 2002 to 2010. *European Journal of Public Health, 25*(suppl 2), 61–64. https://doi.org/10.1093/eurpub/ckv029.

Cooc, N., & Gee, K. A. (2014a). National trends in school victimization among Asian American adolescents. *Journal of Adolescence, 37*(6), 839–849. https://doi.org/10.1016/j.adolescence.2014.05.002.

Cooc, N., & Gee, K. A. (2014b). National trends in school victimization among Asian American adolescents. *Journal of Adolescence, 37*(6), 839–849. https://doi.org/10.1016/j.adolescence.2014.05.002.

Copeland, W. E., Wolke, D., Angold, A., & Costello, E. J. (2013). Adult psychiatric outcomes of bullying and being bullied by peers in childhood and adolescence. *JAMA Psychiatry, 70*(4), 419. https://doi.org/10.1001/jamapsychiatry.2013.504.

Craig, W., Harel-Fisch, Y., Fogel-Grinvald, H., Dostaler, S., Hetland, J., Simons-Morton, B., ... HBSC Bullying Writing Group, H. B. W (2009). A cross-national profile of bullying and victimization among adolescents in 40 countries. *International Journal of Public Health, 54*(Suppl 2), 216–224. https://doi.org/10.1007/s00038-009-5413-9.

de Oliveira, W. A., Silva, M. A. I., da Silva, J. L., de Mello, F. C. M., do Prado, R. R., & Malta, D. C. (2016). Associations between the practice of bullying and individual and contextual variables from the aggressors' perspective. *Jornal de Pediatria, 92*(1), 32–39. https://doi.org/10.1016/j.jped.2015.04.003.

de Oliveira, W. A., Silva, M. A. I., de Mello, F. C. M., Porto, D. L., Yoshinaga, A. C. M., & Malta, D. C. (2015). The causes of bullying: results from the National Survey of School Health (PeNSE). *Revista Latino-Americana de Enfermagem, 23*(2), 275–282. https://doi.org/10.1590/0104-1169.0022.2552.

Delfabbro, P., Winefield, T., Trainor, S., Dollard, M., Anderson, S., Metzer, J., ... Hammarstrom, A. (2006). Peer and teacher bullying/victimization of South Australian secondary school students: Prevalence and psychosocial profiles. *The British Journal of Educational Psychology, 76*(1), 71–90. https://doi.org/10.1348/000709904X24645.

Due, P., Damsgaard, M. T., Lund, R., & Holstein, B. E. (2009). Is bullying equally harmful for rich and poor children?: a study of bullying and depression from age 15 to 27. *European Journal of Public Health, 19*(5), 464–469. https://doi.org/10.1093/eurpub/ckp099.

Due, P., Merlo, J., Harel-Fisch, Y., Damsgaard, M. T., Soc, M., scient, Holstein, B. E., ... Lynch, J. (2009). Socioeconomic inequality in exposure to bullying during adolescence: A comparative, cross-sectional, multilevel study in 35 countries. *American Journal of Public Health, 99*(5), 907–914. https://doi.org/10.2105/AJPH.2008.139303.

Elgar, F. J., Pförtner, T.-K., Moor, I., De Clercq, B., Stevens, G. W., & Currie, C. (2015). Socioeconomic inequalities in adolescent health 2002–2010: a time-series analysis of 34 countries participating in the Health Behaviour in School-aged Children study. *Lancet (London, England), 385*, 2088–2095. https://doi.org/10.1016/S0140-6736(14)61460-4.

Fekkes, M., Pijpers, F. I. M., Fredriks, A. M., Vogels, T., & Verloove-Vanhorick, S. P. (2006). Do Bullied Children Get Ill, or Do Ill Children Get Bullied? A Prospective Cohort Study on the Relationship Between Bullying and Health-Related Symptoms. *Pediatrics, 117*(5), 1568–1574. https://doi.org/10.1542/peds.2005-0187.

Finkelhor, D., Shattuck, A., Turner, H. A., Hamby, S. L., CU, C., & C, S (2014). Trends in children's exposure to violence, 2003 to 2011. *JAMA Pediatrics, 168*(6), 540. https://doi.org/10.1001/jamapediatrics.2013.5296.

Frederick, C. B., Snellman, K., & Putnam, R. D. (2014). Increasing socioeconomic disparities in adolescent obesity. *Proceedings of the National Academy of Sciences of the United States of America, 111*(4), 1338–1342. https://doi.org/10.1073/pnas.1321355110.

Fu, Q., Land, K. C., & Lamb, V. L. (2013). Bullying victimization, socioeconomic status and behavioral characteristics of 12th graders in the United States, 1989 to 2009: Repetitive trends and persistent risk differentials. *Child Indicators Research, 6*(1), 1–21. https://doi.org/10.1007/s12187-012-9152-8.

Galobardes, B., Shaw, M., Lawlor, D. A., Lynch, J. W., & Davey Smith, G. (2006a). Indicators of socioeconomic position (part 1). *Journal of Epidemiology and Community Health, 60*(1), 7–12. https://doi.org/10.1136/jech.2004.023531.

Galobardes, B., Shaw, M., Lawlor, D. A., Lynch, J. W., & Davey Smith, G. (2006b). Indicators of socioeconomic position (part 2). *Journal of Epidemiology and Community Health, 60*(2), 95–101. https://doi.org/10.1136/jech.2004.028092.

Garaigordobil, M., & Machimbarrena, J. M. (2017). Stress, competence, and parental educational styles in victims and aggressors of bullying and cyberbullying. *Psicothema, 29*(3), 335–340. https://doi.org/10.7334/psicothema2016.258.

Hodges, E. V., & Perry, D. G. (1999). Personal and interpersonal antecedents and consequences of victimization by peers. *Journal of Personality and Social Psychology, 76*(4), 677–685. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/10234851.

Hong, J. S., Lee, J., Espelage, D. L., Hunter, S. C., Patton, D. U., & Rivers, T., Jr. (2016). Understanding the Correlates of Face-to-Face and Cyberbullying Victimization Among U.S. Adolescents: A Social-Ecological Analysis. *Violence and Victims, 31*(4), 638–663. https://doi.org/10.1891/0886-6708.VV-D-15-00014.

Jablonska, B., & Lindberg, L. (2007). Risk behaviours, victimisation and mental distress among adolescents in different family structures. *Social Psychiatry and Psychiatric Epidemiology, 42*(8), 656–663. https://doi.org/10.1007/s00127-007-0210-3.

Jansen, D. E., Veenstra, R., Ormel, J., Verhulst, F. C., & Reijneveld, S. A. (2011). Early risk factors for being a bully, victim, or bully/victim in late elementary and early secondary education. The longitudinal TRAILS study. *BMC Public Health, 11*(1), 440. https://doi.org/10.1186/1471-2458-11-440.

Jansen, P. W., Verlinden, M., Berkel, A. D., Mieloo, C., van der Ende, J., Veenstra, R., ... Tiemeier, H. (2012). Prevalence of bullying and victimization among children in early elementary school: Do family and school neighbourhood socioeconomic status matter? *BMC Public Health, 12*(1), 494. https://doi.org/10.1186/1471-2458-12-494.

Kaltiala-Heino, R., Fröjd, S., & Marttunen, M. (2009). Involvement in bullying and depression in a 2-year follow-up in middle adolescence Involvement in bullying and depression in a 2-year follow-up in middle adolescence Involvement in bullying and depression in a 2-year follow-up in middle adolescence. *European Child & Adolescent Psychiatry, 19*(1), 45–55. https://doi.org/10.1007/s00787-009-0039-2&gt.

Keraudren, P., & Rizzo, L. (2010). *Why socio-economic inequalities increase? Facts and policy responses in Europe.* Luxembourg. Retrieved fromhttp://ec.europa.eu/

research/research-eu.
Kim, Y., & Hagquist, C. (2017). Trends in adolescent mental health during economic upturns and downturns: A multilevel analysis of Swedish data 1988-2008. *Journal of Epidemiology and Community Health, 72*(2), 101–108. https://doi.org/10.1136/jech-2017-209784.
King, A., Wold, B., Tudor-Smith, C., & Harel, Y. (1996). The health of youth. A cross-national survey. *WHO Regional Publications European Series, 69*, 1–222. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/8756108.
Koskinen, Seppo, & Martelin, T. (2007). *Nykyiset kansanterveysongelmat ja mahdollisuudet niiden torjumiseen. Teoksessa: Terveydenhuollon menojen hillintä: Rahoitusjärjestelmän ja ennaltaehkäisyn merkitys.* Helsinki. Retrieved fromhttp://vnk.fi/documents/10616/622950/J0407_Terveydenhuollon_menojen_hillintä.pdf/cdc63122-e275-4212-82a0-8d7c2c6f8226?version=1.0.
Krieger, N., Williams, D. R., & Moss, N. E. (1997). Measuring social class in US public health research: Concepts, methodologies, and guidelines. *Annual Review of Public Health, 18*(1), 341–378. https://doi.org/10.1146/annurev.publhealth.18.1.341.
Magklara, K., Skapinakis, P., Gkatsa, T., Bellos, S., Araya, R., Stylianidis, S., ... Mavreas, V. (2012). Bullying behaviour in schools, socioeconomic position and psychiatric morbidity: a cross-sectional study in late adolescents in Greece. *Child and Adolescent Psychiatry and Mental Health, 6*, 8. https://doi.org/10.1186/1753-2000-6-8.
Menrath, I., Prüssmann, M., Müller-Godeffroy, E., Prüssmann, C., Ravens-Sieberer, U., Ottova-Jordan, V., ... Thyen, U. (2015). Subjective health, school victimization, and protective factors in a high-risk school sample. *Journal of Developmental & Behavioral Pediatrics, 36*(5), 305–312. https://doi.org/10.1097/DBP.0000000000000168.
Moisio, P. (2009). *Vähimmäisturva ja köyhyysraja Suomessa – Selvitys sosiaaliturvan kokonaisuudistus (Sata) -komitealle.* Retrieved fromHelsinki: Avauksia. http://thl32-kk.lib.helsinki.fi/bitstream/handle/10024/80420/9c49c982-c5bc-45ed-aced-e9126c063697.pdf?sequence=1.
Molcho, M., Craig, W., Due, P., Pickett, W., Harel-Fisch, Y., Overpeck, M., ... Group, W. (2009). Cross-national time trends in bullying behaviour 1994–2006: findings from Europe and North America. *International Journal of Public Health, 54*, 225–234. https://doi.org/10.1007/s00038-009-5414-8.
Nordhagen, R., Nielsen, A., Stigum, H., & Kohler, L. (2005). Parental reported bullying among Nordic children: A population-based study. *Child: Care Health and Development, 31*(6), 693–701. https://doi.org/10.1111/j.1365-2214.2005.00559.x.
Olweus, D. (1994). Bullying at school: Basic facts and effects of a school based intervention program. *Journal of Child Psychology and Psychiatry, 35*(7), 1171–1190. https://doi.org/10.1111/j.1469-7610.1994.tb01229.x.
Palosuo, H., Koskinen, S., Lahelma, E., & Prättälä, R. (2007). *Terveyden eriarvoisuus Suomessa. Sosioekonomisten terveyserojen muutokset 1980–2005.* Helsinki. Retrieved fromhttps://www.julkari.fi/bitstream/handle/10024/113075/URN%3ANBN%3Afi-fe201504226300.pdf?sequence=1.
Perlus, J., Brooks-Russell, A., Wang, J., & Iannotti, R. (2014). Trends in Bullying, Physical Fighting, and Weapon Carrying Among 6th- Through 10th-Grade Students From 1998 to 2010: Findings From a National Study. *American Journal of Public Health, 104*(6), 1100–1106. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/24825213.
Reijntjes, A., Kamphuis, J. H., Prinzie, P., & Telch, M. J. (2010). Peer victimization and internalizing problems in children: A meta-analysis of longitudinal studies. *Child Abuse & Neglect, 34*(4), 244–252. https://doi.org/10.1016/j.chiabu.2009.07.009.
Roberson, A. J., & Renshaw, T. L. (2017). Structural validity of the HBSC bullying measure. *Journal of Psychoeducational Assessment*(March), https://doi.org/10.1177/0734282917696932.
Rotko, T., Aho, T., Mustonen, N., & Linnanmäki, E. (2007). *Kapeneeko kuilu? Tilannekatsaus tervey serojen kaventamiseen Suomessa 2007–2010.* Retrieved fromhttps://www.julkari.fi/bitstream/handle/10024/80012/9073dc45-9012-4b48-8110-d0f5160a23ef.pdf?sequence=1.
Schumann, L., Craig, W., & Rosu, A. (2014). Power differentials in bullying: Individuals in a community context. *Journal of Interpersonal Violence, 29*(5), 846–865. https://doi.org/10.1177/0886260513505708.
Shetgiri, R. (2013). Bullying and victimization among children. *Advances in Pediatrics, 60*(1), 33–51. https://doi.org/10.1016/j.yapd.2013.04.004.
Shetgiri, R., Lin, H., Avila, R. M., & Flores, G. (2012). Parental characteristics associated with bullying perpetration in US children aged 10 to 17 years. *American Journal of Public Health, 102*(12), 2280–2286. https://doi.org/10.2105/AJPH.2012.300725.
Sourander, A., Helstelä, L., Helenius, H., & Piha, J. (2000). Persistence of bullying from childhood to adolescence–a longitudinal 8-year follow-up study. *Child Abuse & Neglect, 24*(7), 873–881. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/10905413.
Srabstein, J. C., McCarter, R. J., Shao, C., & Huang, Z. J. (2006). Morbidities associated with bullying behaviors in adolescents. School based study of American adolescents. *International Journal of Adolescent Medicine and Health, 18*(4), https://doi.org/10.1515/IJAMH.2006.18.4.587.
Stalmach, M., Tabak, I., & Radiukiewicz, K. (2014). Selected family socio-economic factors as predictors of peer violence among school children in Poland. *Developmental Period Medicine, 18*(4), 495–505. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/25874790.
Tippett, N., & Wolke, D. (2014). Socioeconomic status and bullying: A meta-analysis. *American Journal of Public Health, 104*(6), e48–e59. https://doi.org/10.2105/AJPH.2014.301960.
Torikka, A., Kaltiala-Heino, R., Luukkaala, T., & Rimpelä, A. (2017). Trends in alcohol use among adolescents from 2000 to 2011: The role of socioeconomic status and depression. *Alcohol and Alcoholism, 52*(1), 95–103. https://doi.org/10.1093/alcalc/agw048.
Torikka, A., Kaltiala-Heino, R., Rimpelä, A., Marttunen, M., Luukkaala, T., & Rimpelä, M. (2014). Self-reported depression is increasing among socio-economically disadvantaged adolescents – Repeated cross-sectional surveys from Finland from 2000 to 2011. *BMC Public Health, 14*(1), 408. https://doi.org/10.1186/1471-2458-14-408.
Turner, H. A., Finkelhor, D., & Ormrod, R. (2007). Family structure variations in patterns and predictors of child victimization. *The American Journal of Orthopsychiatry, 77*(2), 282–295. https://doi.org/10.1037/0002-9432.77.2.282.
Vieno, A., Lenzi, M., Gini, G., Pozzoli, T., Cavallo, F., & Santinello, M. (2015). Time trends in bullying behavior in Italy. *The Journal of School Health, 85*(7), 441–445. https://doi.org/10.1111/josh.12269.
WHO (1992). *The ICD-10 classification of mental and behavioural disorders: Clinical descriptions and diagnostic guidelines.* Retrieved fromGeneva: World Health Organization. http://apps.who.int/classifications/icd10/browse/2016/en#/F91.9.

PUBLICATION II

Socioeconomic trends in adolescent smoking in Finland from 2000 to 2015

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Original article

Socioeconomic Trends in Adolescent Smoking in Finland From 2000 to 2015

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A B S T R A C T

Purpose: Smoking is a significant cause of morbidity and mortality worldwide. In the past decades, the prevalence of adolescent smoking has decreased in industrial countries. However, whether the decreasing trend can be seen across all socioeconomic groups is unknown. The aim of this study was to examine time trends in adolescent smoking according to the socioeconomic status among Finnish adolescents between 2000 and 2015.
Methods: A population-based school survey was conducted biennially among 14- to 16-year-old Finns between 2000 and 2015 (n = 761,278). Distributions for frequent smoking, lifelong nonsmoking, and socioeconomic adversities (low parental education, not living with both parents and parental unemployment during the past year) were calculated. Associations were studied using binomial logistic regression results shown by odds ratios with 95% confidence intervals.
Results: Frequent smoking was positively associated and lifelong nonsmoking was negatively associated with socioeconomic adversities. Over the study period, the overall prevalence of frequent smoking decreased and lifelong nonsmoking increased. However, no similar changes were observed among adolescents with most socioeconomic adversities.
Conclusion: Socioeconomic differences in adolescent smoking increased in Finland between 2000 and 2015. Although the overall prevalence of frequent smoking decreased, no similar decrease was observed among adolescents with most socioeconomic adversities. Similarly, although the overall prevalence of lifelong nonsmoking increased, this was not observed among adolescents with most socioeconomic adversities. Socioeconomic adversities should be considered in the prevention of adolescent smoking.

IMPLICATIONS AND CONTRIBUTIONS

Socioeconomic differences in adolescent smoking increased among Finnish adolescents between 2000 and 2015. Although the overall prevalence of frequent smoking decreased and lifelong nonsmoking increased, no similar changes were observed among adolescents with most socioeconomic adversities. Socioecononomic adversities should be considered in the prevention of adolescent smoking.

Smoking is a significant cause of morbidity and mortality worldwide. It is a major risk factor of cancer and cardiovascular diseases, which are leading causes of death in the industrial countries [1,2]. In Europe, approximately 12% of adolescent boys and 11% of girls smoke at least once a week, although the prevalences vary largely between countries [3]. Over the past

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Table 1
Lifelong nonsmoking, frequent smoking, and socioeconomic characteristics among Finnish boys and girls in the eighth and ninth grades of comprehensive school

	Boys (n=381,527)	Girls (n=376,814)	*p*
Age, mean (SD)	15.4 (.7)	15.3 (.6)	<.001
Lifelong nonsmoking (%)			< .001
Yes	53.6	55.5	
No	44.8	43.4	
Missing	1.7	1.1	
Frequent smoking (%)			<.001
Yes	21.7	20.0	
No	76.7	78.9	
Missing	1.7	1.1	
Lives with both parents (%)			<.001
Yes	74.4	73.7	
No	23.3	25.1	
Missing	2.3	1.2	
Both parents only basic education (%)			<.001
Yes	5.6	5.9	
No	86.8	87.5	
Missing	7.6	6.6	
Parental unemployment past year (%)			<.001
No	70.9	69.9	
One parent	23.6	25.6	
Both parents	3.2	3.3	
Missing	2.3	1.2	

SD = standard deviation.

decades, the prevalence of adolescent smoking has decreased in Western countries, including Finland [3–9]. Finland has been one of the world's pioneer countries in reducing smoking since 1977, when the Tobacco Act came into force [10]. The objective of the Tobacco Act is to end the use of tobacco and other nicotine products in Finland by 2030 [11]. The main areas and measures for implementing tobacco policy in Finland are health education, price policy, restrictions, research and development [10].

Smoking prevention requires scientific knowledge on the risk factors of smoking. Several risk factors of adolescent smoking have been identified in the scientific literature, including male gender [3,12], parental smoking [13], genetic factors [14], negative life events [14], mental health problems [15], and smoking peers [15]. In addition, indicators of socioeconomic status (SES) have been examined as risk factors of adolescent smoking. SES is an aggregate concept comprising resource-based (such as material and social resources) and prestige-based (individual's rank or status) indicators of socioeconomic position, which can be measured at individual, household, and neighborhood levels [16]. It can be assessed not only through individual measures, such as education, income, or occupation, but also through composite measures that provide an overall index of socioeconomic level [17].

Of the SES indicators, low parental education has been associated with adolescent smoking [4,7,8]. The likelihood of smoking has also been observed to be more common among adolescents not living with both parents than among those living in intact families [18–20]. However, the association between SES and smoking varies over time and between countries. According to the diffusion of innovations theory by Rogers [21] and the smoking epidemic model by Lopez et al. [22], smoking starts first in higher socioeconomic groups (stage I), and the rest of the population follows later (stage II). As knowledge of the health hazards of smoking increases, smoking starts to level off (stage III) and finally decrease (stage IV), which also occurs first in higher socioeconomic groups, and other groups follow later. Many European countries, including Finland, seem to have reached the fourth stage of the smoking epidemic in the 21st century [23].

Although the overall level of adolescent smoking has decreased, scientific evidence suggests that socioeconomic differences in adolescent smoking may have increased in Western countries in the 21st century. Socioeconomic health disparities can be measured both through absolute measures, such as risk differences, and relative measures, such as risk ratios [24]. Absolute deprivation theory suggests that differential health outcomes result primarily from exposure to socioeconomic adversities, such as poverty, low education, and limited health services, whereas relative deprivation theory suggests that relative deprivation, embodied by psychosocial stress, leads to health disparities by influencing an individual's sense of well-being and subsequent health behaviors [24]. Both absolute and relative measures are used in the scientific literature, and both are meaningful measures for monitoring inequality. In a European time trend study [25], absolute educational differences in adolescent smoking increased in Croatia and Italy, and relative educational differences in adolescent smoking increased especially in the Netherlands and Belgium between 2002 and 2010. Richter and Leppin [26] observed that the level of socioeconomic disparities in adolescent smoking remained virtually unchanged in Germany between 1994 and 2002. Rasmussen et al. [9] found that socioeconomic differences in adolescent smoking fluctuated between 1991 and 2006. In addition, one study on the subject was conducted in Finland between 1977 and 2007 [27], in which absolute differences in adolescent smoking according to parental education level increased. Decreasing socioeconomic health disparities is an important public health objective, and therefore, data on such disparities is required [28]. The aim of this study was to examine socioeconomic differences in smoking among Finnish adolescents between 2000 and 2015. Our research questions include the following:

(1) Did the prevalences of frequent smoking and lifelong nonsmoking change among Finnish adolescents between years 2000 and 2015?
(2) Are frequent smoking and lifelong nonsmoking associated with socioeconomic adversities (low parental education, not living with both parents and parental unemployment) among Finnish adolescents?
(3) Did the differences between socioeconomic groups in frequent smoking and lifelong nonsmoking increase or decrease among Finnish adolescents between years 2000 and 2015?

Methods

Data and participants

The School Health Promotion Study by the National Institute for Health and Welfare is a survey that examines the health, health behavior, and school experiences of Finnish adolescents. The survey has been conducted biennially since 1996 among eighth and ninth graders with pooled 2-year data (2000–2001, 2002–2003, 2004–2005, 2006–2007, 2008–2009, 2010–2011,

Table 2
Lifelong nonsmoking and frequent smoking over time among Finnish boys and girls in the eighth and ninth grades of comprehensive school[a]

	2002–2003	2004–2005	2006–2007	2008–2009	2010–2011	2012–2013	2014–2015
Boys							
Lifelong nonsmoking	1.2 (1.2–1.3)	1.6 (1.5–1.6)	1.8 (1.8–1.9)	1.8 (1.7–1.8)	1.9 (1.8–1.9)	2.0 (1.9–2.0)	3.2 (3.0–3.3)
Frequent smoking	.8 (.8–.8)	.7 (.6–.7)	.6 (.6–.6)	.6 (.6–.6)	.6 (.6–.6)	.5 (.5–.6)	.4 (.3–.4)
Girls							
Lifelong nonsmoking	1.3 (1.2–1.3)	1.6 (1.5–1.6)	1.8 (1.7–1.8)	1.9 (1.8–1.9)	1.9 (1.8–1.9)	2.3 (2.3–2.4)	3.8 (3.6–3.9)
Frequent smoking	.8 (.8–.9)	.7 (.7–.7)	.6 (.5–.6)	.6 (.5–.6)	.6 (.5–.6)	.5 (.4–.5)	.3 (.3–.3)

Values are presented as OR (95% CI).
CI = confidence interval; OR = odds ratio.
[a] Time period 2000–2001 is used as a reference category.

2012–2013, 2014–2015). The data were collected anonymously during a school lesson under the supervision of a teacher, who did not interfere with the responses. Participants were informed about the voluntary nature of the study in both orally and in writing, and returning the questionnaire was taken to be consent to participate. The questionnaire took about 30–45 minutes to complete. After this, the questionnaires were put in an envelope, sealed, and returned directly to the research center. The timing of the study, sampling, and data collection methods were held constant in each survey round. Altogether, 761,278 (50,404–109,127 biennially) eighth and ninth graders participated in the survey. The eighth graders were aged 14–15 years and the ninth graders 15–16 years at the time of the surveys. When the non-responders were excluded, the biennial cohorts covered between 43% and 82% of the whole age cohort of the country. The study was approved by the ethics committee of Pirkanmaa Hospital District and the National Institute of Health and Welfare.

Measures

Smoking was elicited with two questions, the first one measuring lifelong smoking: "How many cigarettes, pipefuls and cigars have you smoked altogether?" The response alternatives were "none/only one/about 2–50/50 or more." The second question measured current smoking: "Which of the following alternatives describes best your CURRENT SMOKING?" The response alternatives were "I smoke once a day or more often/I smoke once a week or more often but not daily/I smoke less often than once a week/I have quit smoking." For the analyses, two dichotomous variables were created: "frequent smoking," in which smoking once a week or more often was regarded as frequent smoking, and "lifelong nonsmoking," which was dichotomized as having never tried smoking versus having tried smoking at least once.

Table 3
Lifelong nonsmoking and frequent smoking by socioeconomic adversities among Finnish boys and girls in the eighth and ninth grades of comprehensive school

	Lifelong nonsmoking	Frequent smoking
Boys		
Family structure		
Both parents	ref	ref
Not living with both parents	.6 (.6–.6)	2.1 (2.0–2.1)
Both parents with low education		
No	ref	ref
Yes	.7 (.7–.7)	1.7 (1.6–1.7)
Parental unemployment		
Neither parent	ref	ref
One parent	.8 (.8–.8)	1.4 (1.4–1.5)
Both parents	.5 (.5–.5)	2.6 (2.5–2.7)
Girls		
Family structure		
Both parents	ref	ref
Not living with both parents	.5 (.5–.5)	2.2 (2.1–2.2)
Both parents with low education		
No	ref	ref
Yes	.7 (.7–.8)	1.6 (1.5–1.6)
Parental unemployment		
Neither parent	ref	ref
One parent	.7 (.7–.7)	1.5 (1.5–1.6)
Both parents	.6 (.5–.6)	2.3 (2.2–2.4)

Values are presented as OR (95% CI).
CI = confidence interval; OR = odds ratio.

The socioeconomic variables recorded were parental education, parental unemployment during the past year, and family structure. Parental education was elicited as follows: "What is the highest educational qualification your father/mother has achieved?" The response options in the 2000 questionnaire were "basic school/vocational school/high school and/or vocational school/university or polytechnic." The response options varied a little over time: for instance, in the 2013 questionnaire, there was a response option "no education," which was removed again in the 2015 questionnaire. For the analyses, parental education was dichotomized to parental basic education only (including the response alternative "no education") versus other. Parental unemployment was elicited as follows: "Have your parents been unemployed or laid off work during the past YEAR?" The response alternatives were the same in all questionnaires: "neither/one parent/both parents." The family structure was elicited as follows: "My family consists of…" The response options in the 2000 questionnaire were: "mother and father/mother and stepfather/father and stepmother/mother only/father only/spouse/other caregiver." The response options varied slightly over time. For the analyses, family structure was dichotomized to living with both parents versus other. In this article, all three variables are referred to as socioeconomic adversities. In addition, a variable "cumulative socioeconomic adversity" was created, in which all three socioeconomic variables were combined: a score of 0 stood for having no socioeconomic adversities studied (living with both parents, no parental unemployment and at least one parent with higher than basic education) and a score of 4 stood for having all socioeconomic adversities studied (not living with both parents, both parents unemployed, and both parents with basic education only). The prevalences of socioeconomic adversities are presented elsewhere [29].

Statistical analysis

All statistical analyses were conducted using SPSS software (version 24). Bivariate associations were studied using binomial

Table 4
Frequent smoking and lifelong nonsmoking over time by cumulative socioeconomic adversity among Finnish boys and girls in the eighth and ninth grades of comprehensive school

Number of sociodemographic adversities	2000–2001	2002–2003	2004–2005	2006–2007	2008–2009	2010–2011	2012–2013	2014–2015
Frequent smoking boys								
0	24.3 (4,924/20,280)	20.7 (5,546/26,737)	16.5 (4,683/28,427)	15.1 (4,611/30,572)	16.2 (4,767/29,479)	15.6 (4,120/26,408)	12.9 (2,900/22,457)	8.6 (972/11,238)
1	31.1 (3,964/12,728)	28.8 (4,251/14,775)	25.2 (3,827/15,212)	22.8 (3,332/14,605)	24.0 (3,575/14,917)	22.6 (3,437/15,241)	19.7 (2,960/15,016)	13.3 (1,090/8,195)
2	40.8 (1,916/4,696)	38.2 (1,913/5,005)	32.2 (1,567/4,874)	31.6 (1,415/4,478)	31.3 (1,461/4,664)	31.3 (1,589/5,076)	28.4 (1,559/5,495)	18.6 (586/3,158)
3	46.5 (418/898)	43.4 (371/854)	42.7 (367/859)	42.3 (302/714)	44.3 (295/666)	42.6 (377/886)	37.8 (335/886)	27.9 (150/538)
4	67.3 (74/110)	63.8 (83/130)	58.8 (70/119)	72.7 (96/132)	74.1 (106/143)	77.3 (136/176)	63.8 (143/224)	64.5 (127/197)
Frequent smoking girls								
0	22.2 (4,287/19,334)	19.3 (4,807/24,767)	16.3 (4,373/26,882)	13.2 (3,895/29,410)	13.5 (3,871/28,625)	13.1 (3,341/25,437)	10.0 (2,189/21,970)	6.3 (712/11,269)
1	30.4 (3,875/12,767)	27.7 (4,027/14,563)	24.4 (3,707/15,168)	21.4 (3,304/15,445)	21.2 (3,358/15,846)	20.3 (3,178/15,644)	17.0 (2,599/15,316)	11.2 (958/8,577)
2	39.3 (2,039/5,188)	37.6 (2,017/5,360)	34.1 (1,930/5,662)	30.8 (1,557/5,062)	29.9 (1,518/5,085)	29.2 (1,691/5,785)	24.3 (1,502/6,170)	17.5 (624/3,556)
3	43.6 (422/968)	41.1 (395/960)	41.9 (371/885)	37.4 (280/749)	38.0 (290/764)	36.9 (398/1,078)	30.1 (321/1,068)	25.6 (168/656)
4	52.9 (45/85)	57.0 (53/93)	61.8 (55/89)	58.2 (57/98)	63.7 (65/102)	65.0 (106/163)	59.3 (102/172)	55.4 (51/92)
Lifelong nonsmoking boys								
0	45.4 (9,209/20,280)	51.3 (13,708/26,737)	57.8 (16,431/28,427)	60.7 (18,559/30,572)	60.1 (17,708/29,479)	62.0 (16,370/26,408)	64.1 (14,404/22,457)	74.2 (8,338/11,238)
1	39.7 (5,052/12,728)	43.8 (6,465/14,775)	48.8 (7,423/15,212)	52.2 (7,617/14,605)	51.8 (7,730/14,917)	54.0 (8,237/15,241)	56.3 (8,457/15,016)	66.9 (5,479/8,195)
2	32.7 (1,535/4,696)	35.5 (1,778/5,005)	41.6 (2,027/4,874)	43.0 (1,924/4,478)	44.2 (2,060/4,664)	45.0 (2,283/5,076)	48.0 (2,639/5,495)	60.2 (1,902/3,158)
3	30.1 (270/898)	30.3 (259/854)	33.4 (287/859)	32.3 (230/714)	34.5 (230/666)	34.1 (302/886)	39.6 (351/886)	50.9 (274/538)
4	20.9 (23/110)	21.5 (28/130)	19.3 (23/119)	13.6 (18/132)	11.2 (16/143)	13.6 (24/176)	21.4 (48/224)	23.4 (46/197)
Lifelong nonsmoking girls								
0	46.9 (9,066/19,334)	53.7 (13,392/24,946)	59.3 (15,949/26,882)	62.2 (18,301/29,410)	63.1 (18,063/28,625)	64.6 (16,436/25,437)	70.5 (15,499/21,970)	79.8 (8,989/11,269)
1	40.7 (5,193/12,767)	44.5 (6,478/14,563)	49.1 (7,442/15,168)	52.2 (8,057/15,445)	53.0 (8,404/15,846)	54.5 (8,532/15,644)	60.5 (9,267/15,316)	71.4 (6,122/8,577)
2	33.8 (1,755/5,188)	35.7 (1,913/5,360)	41.1 (2,327/5,662)	41.2 (2,085/5,062)	44.1 (2,241/5,085)	44.9 (2,597/5,785)	50.8 (3,136/6,170)	62.1 (2,208/3,556)
3	30.8 (298/968)	31.7 (304/960)	33.9 (300/885)	36.6 (274/749)	38.2 (292/764)	40.1 (432/1,078)	45.0 (481/1,068)	53.2 (349/656)
4	23.5 (20/85)	24.7 (23/93)	24.7 (22/89)	21.4 (21/98)	21.6 (22/102)	23.3 (38/163)	24.4 (42/172)	25.0 (23/92)

Values are presented as % (n/N).

logistic regression results shown as odds ratios with 95% confidence intervals. Frequent smoking and lifelong nonsmoking were entered as dependent variables. In the first model, categorical time periods (2000–2001, 2002–2003, 2004–2005, 2006–2007, 2008–2009, 2010–2011, 2012–2013, 2014–2015) were entered as independent factors, using the time period 2000–2001 as a reference category. In the second model, family structure (living with both parents/other), parental unemployment during the past year (neither/one parent/both parents), and parental education (both parents basic education only/other) were entered as independent factors one at a time. In the third model, the file was split according to categorical time periods, and cumulative socioeconomic adversity was entered as an independent factor.

Results

The overall prevalence of frequent smoking was 22% among boys and 20% among girls. Fifty-four percent of boys and 54% of girls had never tried smoking (Table 1). At the overall level, the ORs for frequent smoking decreased among both sexes over the study period, whereas the ORs for lifelong nonsmoking increased among both sexes over time (Table 2).

Socioeconomic differences were observed both in frequent smoking and lifelong nonsmoking (Table 3). Frequent smoking was more common among boys and girls not living with both parents than among those living with both parents. Frequent smoking was more common among boys and girls both of whose parents had only basic education than among those who had at least one parent with higher than basic education. Frequent smoking was also positively associated with parental unemployment during the past year among both sexes. Opposite associations were observed in lifelong nonsmoking.

The prevalences of smoking according to cumulative socioeconomic adversity are presented in Table 4. The prevalence of frequent smoking decreased among boys and girls with the least socioeconomic adversities over the study period, whereas no decrease was observed among adolescents with most socioeconomic adversities. Similarly, the prevalence of lifelong nonsmoking increased among adolescents with least socioeconomic adversities, whereas they varied only slightly among those with most socioeconomic adversities (Tables 4 and 5). The relative differences according to cumulative socioeconomic adversity are presented in Table 5. The ORs in frequent smoking between adolescents not living with both parents, with both parents unemployed, and with parents having basic education only and adolescents living with both parents, with no parental unemployment, and at least one parent with higher than basic education increased among both sexes over the study period. The ORs in lifelong nonsmoking according to cumulative socioeconomic adversity varied only slightly over time.

Discussion

In this study, both frequent smoking and lifelong nonsmoking were associated with socioeconomic adversities among 14- to 16-year-old adolescents in Finland. The prevalence of frequent smoking was greater among adolescents with any of the socioeconomic adversities studied than among those with no socioeconomic adversities. Conversely, the prevalence of lifelong nonsmoking was lower among adolescents with any of the socioeconomic adversities studied than among those with no socioeconomic adversities. Frequent smoking was positively associated and lifelong nonsmoking was negatively associated with the number of socioeconomic adversities. Most importantly, although the overall prevalences of frequent smoking decreased and lifelong nonsmoking increased, no similar

Table 5
Frequent smoking and lifelong nonsmoking over time by cumulative socioeconomic adversity among Finnish boys and girls in the eighth and ninth grades of comprehensive school[a]

Number of sociodemographic adversities	2000–2001	2002–2003	2004–2005	2006–2007	2008–2009	2010–2011	2012–2013	2014–2015
Frequent smoking boys								
1	1.4 (1.3–1.5)	1.5 (1.5–1.6)	1.7 (1.6–1.8)	1.7 (1.6–1.8)	1.6 (1.6–1.7)	1.6 (1.5–1.7)	1.7 (1.6–1.8)	1.6 (1.5–1.8)
2	2.2 (2.0–2.3)	2.4 (2.2–2.5)	2.4 (2.3–2.6)	2.6 (2.4–2.8)	2.4 (2.2–2.5)	2.5 (2.3–2.6)	2.7 (2.5–2.9)	2.4 (2.2–2.7)
3	2.7 (2.4–3.1)	2.9 (2.5–3.4)	3.8 (3.3–4.3)	4.2 (3.6–4.8)	4.2 (3.6–4.9)	4.1 (3.6–4.7)	4.1 (3.6–4.8)	4.2 (3.5–5.2)
4	6.7 (4.4–10.0)	6.7 (4.7–9.5)	7.1 (4.9–10.3)	15.6 (10.5–23.1)	16.3 (11.0–24.2)	18.1 (12.7–25.9)	13.1 (9.9–17.5)	22.8 (16.6–31.4)
Frequent smoking girls								
1	1.5 (1.5–1.6)	1.6 (1.5–1.7)	1.7 (1.6–1.8)	1.8 (1.7–1.9)	1.7 (1.6–1.8)	1.7 (1.6–1.8)	1.8 (1.7–2.0)	1.9 (1.7–2.1)
2	2.3 (2.1–2.4)	2.5 (2.4–2.7)	2.7 (2.5–2.8)	2.9 (2.7–3.1)	2.7 (2.5–2.9)	2.7 (2.6–2.9)	2.9 (2.7–3.1)	3.2 (2.8–3.6)
3	2.7 (2.4–3.1)	2.9 (2.6–3.4)	3.7 (3.2–4.2)	4.0 (3.4–4.6)	3.9 (3.4–4.5)	3.9 (3.4–4.4)	3.9 (3.4–4.5)	5.2 (4.3–6.2)
4	3.9 (2.5–6.0)	5.5 (3.6–8.3)	8.2 (5.3–12.6)	9.4 (6.3–14.2)	11.4 (7.6–17.1)	12.2 (8.8–16.9)	13.2 (9.7–18.0)	19.2 (12.6–29.4)
Lifelong nonsmoking boys								
1	.8 (.8–.8)	.7 (.7–.8)	.7 (.7–.7)	.7 (.7–.7)	.7 (.7–.7)	.7 (.7–.7)	.7 (.7–.7)	.7 (.7–.8)
2	.6 (.5–.6)	.5 (.5–.6)	.5 (.5–.5)	.5 (.5–.5)	.5 (.5–.6)	.5 (.5–.5)	.5 (.5–.5)	.5 (.5–.6)
3	.5 (.4–.6)	.4 (.4–.5)	.4 (.3–.4)	.3 (.3–.4)	.3 (.3–.4)	.3 (.3–.4)	.4 (.3–.4)	.4 (.3–.4)
4	.3 (.2–.5)	.3 (.2–.4)	.2 (.1–.3)	.1 (.1–.2)	.1 (.0–.1)	.1 (.1–.1)	.2 (.1–.2)	.1 (.1–.2)
Lifelong nonsmoking girls								
1	.8 (.7–.8)	.7 (.7–.7)	.7 (.6–.7)	.7 (.6–.7)	.7 (.6–.7)	.7 (.6–.7)	.6 (.6–.7)	.6 (.6–.7)
2	.6 (.5–.6)	.5 (.4–.5)	.5 (.4–.5)	.4 (.4–.4)	.5 (.4–.5)	.4 (.4–.5)	.4 (.4–.5)	.4 (.4–.4)
3	.5 (.4–.6)	.4 (.3–.5)	.3 (.3–.4)	.4 (.3–.4)	.4 (.3–.4)	.4 (.3–.4)	.3 (.3–.4)	.3 (.2–.3)
4	.3 (.2–.6)	.3 (.2–.4)	.2 (.1–.4)	.2 (.1–.3)	.2 (.1–.3)	.2 (.1–.2)	.1 (.1–.2)	.1 (.1–.1)

Values are presented as OR (95% CI).
CI = confidence interval; OR = odds ratio.
[a] Adolescents in the same time period living with both parents, with at least one parent with higher than basic education, and both parents employed is used as a reference category.

changes were observed among adolescents with most socioeconomic adversities. The relative differences in frequent smoking also increased over the study period.

The association between adolescent smoking and parental education has been observed in earlier studies [7,8]. Parents with low education level are more likely to smoke [30,31], and parental smoking is a major risk factor of adolescent smoking [32]. Parents with higher education may also know more about the adverse health effects of smoking and thus have more disapproval of the substance. The association between adolescent smoking and not living with both parents also corroborates earlier studies [18–20]. Children of divorced parents experience on average more stressful life events and have more mental health problems than children of nondivorced parents, which predispose adolescents to smoking [33,34]. To the best of our knowledge, the association between adolescent smoking and parental unemployment has not been studied previously. Parental unemployment is associated with financial problems in the family and adolescent psychosocial problems, which are known risk factors of adolescent smoking [35,36].

Most importantly, although the overall proportion of frequent smoking decreased from 2000 to 2015, no similar decrease was observed among adolescents with most socioeconomic adversities. This resulted in an increase in relative socioeconomic differences across the study years. Similarly, although the overall prevalence of lifelong nonsmoking increased, no similar increase was observed among adolescents with most socioeconomic adversities. However, relative differences in lifelong nonsmoking varied only slightly over time. Increased socioeconomic disparities in adolescent smoking have also been observed in other studies over Europe in the 21st century [9,25,27]. Smoking prevention programs have been shown to be less effective in lower socioeconomic groups [37], which may partly explain why smoking has not decreased in lower socioeconomic groups despite strong national tobacco policy. Therefore, new preventive efforts targeted at adolescents with socioeconomic adversities should be considered. It is also possible that hardship in the lowest socioeconomic groups has increased over time. Societal changes, such as increases in long-term unemployment and decreases in social security benefits may have widened the gap between socioeconomic groups in the 21st century [38]. Decreasing socioeconomic health disparities is an important public health objective, as socioeconomic health disparities increase individual suffering and inflict burden on public health care and economy [28].

Methodological considerations

This study has several strengths; it is based on a nationwide population-based time trend study with a large sample size consisting of Finnish eighth and ninth graders ($n = 761,278$) and a high participation rate (43%–82% of the whole age cohort of the country). The school sample of this age group is comprehensive as basic education is compulsory for everyone under the age of 16 years in Finland. The measurement of smoking, sampling, and timing of the study were held constant over the study years. This study addressed both absolute and relative socioeconomic differences, which are both important when studying changes in socioeconomic disparities over time [39].

This study has also some limitations. Self-report data are susceptible to errors, such as recall bias and mischievous responding. Especially parental education can be difficult for an adolescent to recall, which may have caused the proportion of missing responses on that question to be higher than on other questions. However, the proportions of missing responses on all questions studied were very small and thus did not affect the results. Mischievous responding is another source of error in studies relying on self-report data. Mischievous responders are defined as “youths who provide extreme, and potentially untruthful, responses to multiple questions” [40]. The degree of mischievous responding was not assessed in this study. However, there is no reason to assume that mischievous responding had changed over time.

The socioeconomic differences in adolescent smoking increased in Finland between years 2000 and 2015. Although the overall proportion of frequent smoking decreased over the study period, no similar decrease was observed among adolescents with the most socioeconomic adversities. Similarly, although the overall prevalence of lifelong nonsmoking increased, this was not observed among adolescents with most socioeconomic adversities. Socioeconomic adversities should be considered in the prevention of adolescent smoking.

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References

[1] Saha SP, Bhalla DK, Whayne TF, et al. Cigarette smoke and adverse health effects: An overview of research trends and future needs. Int J Angiol 2007;16:77–83.
[2] Das SK. Harmful health effects of cigarette smoking. Mol Cell Biochem 2003;253:159–65.
[3] WHO. Tobacco use in adolescence. Available at: http://users.jyu.fi/~jtynjala/press/WHO-HBSC_factsheet_Tobacco_AW2.pdf. Accessed December 29, 2017.
[4] Wallace JM, Vaughn MG, Bachman JG, et al. Race/ethnicity, socioeconomic factors, and smoking among early adolescent girls in the United States. Drug Alcohol Depend 2009;104:S42–9.
[5] Gadalla TM. Unhealthy behaviours among Canadian adolescents: Prevalence, trends and correlates. Chronic Dis Inj Can 2012;32:156–63.
[6] Gielkens-Sijstermans CM, Mommers MA, Hoogenveen RT, et al. Reduction of smoking in Dutch adolescents over the past decade and its health gains: A repeated cross-sectional study. Eur J Public Health 2010;20:146–50.
[7] Kuntz B, Lampert T. Smoking and passive smoke exposure among adolescents in Germany. Dtsch Arztebl Int 2016;113:23–30.
[8] Moberg DP, Rettammel RJ. Tobacco use trends and correlates among students in the Madison metropolitan school district. Wis Med J 2001;100:43–8.
[9] Rasmussen M, Due P, Damsgaard MT, et al. Social inequality in adolescent daily smoking: Has it changed over time? Scand J Public Health 2009;37:287–94.
[10] Finnish tobacco control policy and legislation. Available at: https://thl.fi/fi/web/alcohol-tobacco-and-addictions/tobacco/finnish-tobacco-control-policy-and-legislation. Accessed October 22, 2018.
[11] Tobacco Act. Available at: https://savutonsuomi.fi/en/towards-tobacco-free-finland/tobacco-act/. Accessed October 23, 2018.
[12] Okoli C, Greaves L, Fagyas V. Sex differences in smoking initiation among children and adolescents. Public Health 2013;127:3–10.
[13] Selya AS, Dierker LC, Rose JS, et al. Risk factors for adolescent smoking: Parental smoking and the mediating role of nicotine dependence. Drug Alcohol Depend 2012;124:311–8.
[14] Pampel FC, Boardman JD, Daw J, et al. Life events, genetic susceptibility, and smoking among adolescents. Soc Sci Res 2015;54:221–32.
[15] Audrain-McGovern J, Rodriguez D, Kassel JD. Adolescent smoking and depression: Evidence for self-medication and peer smoking mediation. Addiction 2009;104:1743–56.
[16] Krieger N, Williams DR, Moss NE. Measuring social class in US public health research: Concepts, methodologies, and guidelines. Annu Rev Public Health 1997;18:341–78.
[17] Galobardes B, Shaw M, Lawlor DA, et al. Indicators of socioeconomic position (part 1). J Epidemiol Community Health 2006;60:7–12.

[18] Wallace JM, Forman TA, Guthrie BJ, et al. The epidemiology of alcohol, tobacco and other drug use among black youth. J Stud Alcohol 1999;60:800–9.
[19] Ledoux S, Miller P, Choquet M, et al. Family structure, parent-child relationships, and alcohol and other drug use among teenagers in France and the United Kingdom. Alcohol Alcohol 2002;37:52–60.
[20] Du Y, Palmer PH, Sakuma K-L, et al. The association between family structure and adolescent smoking among multicultural students in Hawaii. Prev Med Rep 2015;2:206–12.
[21] Rogers EM. Diffusion of innovations. 1995.
[22] Lopez AD, Collishaw NE, Piha T. A descriptive model of the cigarette epidemic in developed countries. Tob Control 1994;3:242–7.
[23] Huisman M, Kunst AE, Mackenbach JP. Educational inequalities in smoking among men and women aged 16 years and older in 11 European countries. Tob Control 2005;14:106–13.
[24] van Zon SKR, Bültmann U, Mendes de Leon CF, et al. Absolute and relative socioeconomic health inequalities across age groups. PLoS One 2015;10:e0145947.
[25] de Looze M, ter Bogt T, Hublet A, et al. Trends in educational differences in adolescent daily smoking across Europe, 2002-10. Eur J Public Health 2013;23:846–52.
[26] Richter M, Leppin A. Trends in socio-economic differences in tobacco smoking among German school children. Eur J Public Health 2007;17:565–71.
[27] Doku D, Koivusilta L, Rainio S, et al. Socioeconomic differences in smoking among Finnish adolescents from 1977 to 2007. J Adolesc Health 2010;47:479–87.
[28] Koskinen S, Martelin T. Current public health problems and their prevention. In: Restraining Healthcare Expenditures: The Significance of Financial System and Prevention. Helsinki: Prime Minister's Office; 2007.
[29] Knaappila N, Marttunen M, Fröjd S, et al. Socioeconomic trends in school bullying among Finnish adolescents from 2000 to 2015. Child Abuse Negl 2018;86:100–8.
[30] Gilman SE, Martin LT, Abrams DB, et al. Educational attainment and cigarette smoking: A causal association? Int J Epidemiol 2008;37:615–24.
[31] Dobson R. Poor more likely to smoke and less likely to quit. BMJ 2004;328:914.
[32] Gilman SE, Rende R, Boergers J, et al. Parental smoking and adolescent smoking initiation: An intergenerational perspective on tobacco control. Pediatrics 2009;123:e274–81.
[33] Amato P, Keith B. Parental divorce and the well-being of children: A meta-analysis. Psychol Bull 1991;110:26–46.
[34] Rajesh V, Diamond PM, Spitz MR, et al. Smoking initiation among Mexican heritage youth and the roles of family cohesion and conflict. J Adolesc Health 2015;57:24–30.
[35] Kim Y, Hagquist C. Trends in adolescent mental health during economic upturns and downturns: A multilevel analysis of Swedish data 1988-2008. J Epidemiol Community Health 2017;72:101–8.
[36] Baum A, Fleming R, Reddy DM. Unemployment stress: Loss of control, reactance and learned helplessness. Soc Sci Med 1986;22:509–16.
[37] Pampel FC. Diffusion, cohort change, and social patterns of smoking. Soc Sci Res 2005;34:117–39.
[38] Moisio P. Minimum social security benefit and poverty line in Finland - report for comprehensive social security reform (Sata) committee. Helsinki: Openings; 2009.
[39] Houweling TA, Kunst AE, Huisman M, et al. Using relative and absolute measures for monitoring health inequalities: Experiences from cross-national analyses on maternal and child health. Int J Equity Health 2007;6:15.
[40] Robinson-Cimpian JP. Inaccurate estimation of disparities due to mischievous responders. Educ Res 2014;43:171–85.

PUBLICATION III

Changes in delinquency according to socioeconomic status among Finnish adolescents from 2000 to 2015

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Changes in delinquency according to socioeconomic status among Finnish adolescents from 2000 to 2015

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Abstract

Background: Scientific literature suggests that the prevalence of delinquency amongst adolescents has decreased internationally in past decades. However, whether this change is consistent across all socioeconomic groups has not yet been studied.
Objective: The aim of this study was to examine changes in delinquency amongst Finnish adolescents according to socioeconomic status between 2000 and 2015.
Method: A population-based school survey was conducted biennially amongst 14-16-year-old Finns between 2000 and 2015 (n = 761,278). Distributions for delinquency and socioeconomic adversities (low parental education, not living with both parents and parental unemployment in the past year) were calculated using crosstabs. Associations between delinquency, time, and socioeconomic adversities were studied using binomial logistic regression results shown by odds ratios with 95 % confidence intervals.
Results: Delinquency was positively associated with all three socioeconomic adversities studied and cumulative socioeconomic adversity. Although the prevalence of delinquency varied only slightly between 2000 and 2015 in the overall population, it increased significantly amongst adolescents with most socioeconomic adversities.
Conclusions: The findings indicate that socioeconomic differences in delinquency have increased amongst Finnish adolescents in past decades. Delinquency prevention and intervention programs should take socioeconomic adversities into account.

Keywords: Adolescent; delinquency; socioeconomic factors; surveys and questionnaires

Introduction

Delinquency and other problem behaviors are rather common amongst adolescents (1, 2). Delinquency encompasses a wide range of antisocial acts which are illegal or lawfully interpreted as constituting delinquency, including theft, violence and destruction of property (3). The prevalence of delinquency amongst adolescents varies between 6 and 18 % in Europe and the United States of America (4, 5). Unlike assumed in the public debate, the prevalence of delinquency has not increased internationally in past decades, but on the contrary, it may have even decreased (6-9).

Research has identified several risk factors for delinquency, including male gender (10), genetic factors (10), lower intellectual ability (11), aggressiveness (1), mental health disorders (12, 13), exposure to maltreatment in childhood (14, 15) and delinquent peers (16). In addition, low socioeconomic status (SES) increases the risk for delinquency. SES is an aggregate concept comprising resource-based (such as material and social resources) and prestige-based (individual's rank or status) indicators of socioeconomic position, which can be measured at both individual, household and neighborhood levels (17). It can be assessed through individual measures, such as education, income or occupation (18, 19), but also through composite measures that provide an overall index of socioeconomic level. Delinquency has been observed

to be more common amongst adolescents living in non-intact families than amongst those living in intact families (2, 20-24). Delinquency has also been associated with low level of parental education (20-22, 24) and parental unemployment (25, 26).

Scientific evidence suggests that socioeconomic disparities have increased in several areas of adolescent health and well-being in the Nordic countries in past decades. Torikka et al. (27, 28) found that socioeconomic differences in the prevalence of depression, frequent alcohol use and drunkenness increased amongst Finnish adolescents from 2000 to 2011. Socioeconomic disparities also increased in self-rated health amongst Swedish adolescents between 2002 and 2014 (29). In a Finnish time series study (30), the overall prevalence of bullying at school varied only slightly between 2000 and 2015, but both bullying perpetration and victimization increased amongst adolescents with most socioeconomic adversities. Therefore, although the overall prevalence of delinquency has not increased, this may not be true in all socioeconomic groups. To the best of our knowledge, however, no studies have so far investigated changes in delinquency amongst adolescents according to the SES.

Delinquency has negative consequences for the individual, being associated with school dropout (31), substance abuse (32), mental health disorders (33) and criminality later in life (1). In addition to individual suffering, delinquent behavior has far-reaching impacts on society, impairing perceived safety in the community (34) and inflicting significant costs on the public economy (35). In order to prevent delinquency, scientific knowledge on its risk factors and trends is essential. The aim of this study was to examine changes in delinquency according to SES amongst Finnish adolescents between 2000 and 2015. Our research questions were:

RQ1. Did the prevalence of delinquency change amongst Finnish adolescents between 2000 and 2015?

RQ2. Was delinquency associated with socioeconomic adversities (low parental education, not living with both parents and parental unemployment in the past year)?

RQ3. Were the changes in delinquency over time similar across socioeconomic groups?

Methods

Data and participants

The School Health Promotion Study is a nationwide anonymous classroom survey that examines the health, health behavior and school experiences of Finnish adolescents. The survey has been conducted biennially since 1996 amongst 8th and 9th graders with pooled two-year data. The survey is sent to every municipality in Finland, and the municipalities decide if the schools in their area participate in the survey. This study comprises the responses of 8th and 9th graders between 2000 and 2015. Altogether, 761,278 (50,404-109,127 biennially) 8th and 9th graders participated in the survey. The 8th graders were 14-15 years old and the 9th graders were 15-16 years old at the time of the surveys. The biennial cohorts covered 43-82 % of the whole age cohort of the country. The study was approved by the ethics committee of Pirkanmaa Hospital District and the National Institute of Health and Welfare.

Measures

The self-report questions on delinquent behavior were adapted from the Finnish Self-Report Delinquency Study questionnaire, which is a modified version of the International Self-Report Delinquency Study (ISRD) instrument (36). The ISRD instrument has been shown to possess adequate reliability in test-retest studies (37). Delinquent behavior was elicited with five questions: 'During the past 12 months have you 1) drawn tags or graffiti on walls or elsewhere?; 2) deliberately damaged or destroyed school property or the school building; 3) deliberately damaged or destroyed other property; 4) stolen from a shop or a stall; 5) beaten someone up?' The questions remained constant over the study years. Response options to all questions were no (= 0), once (= 1), 2-4 times (= 2) and more than 4 times (= 3). A sum score ranging between 0 and 15 was formed of the five questions, in which a value of 4 or more (representing the 90th percentile) was used to indicate delinquency. The 90th percentile cut-off point has been used previously in the scientific literature (38). A considerable benefit of using a relative measure, as opposed to an absolute measure, is that it takes into account the varying prevalence of delinquency across different countries and cultures.

The socioeconomic variables recorded were parental education, parental unemployment in the past year and family structure. Parental education was elicited as follows: 'What is the highest educational qualification your father/mother has achieved?' The response options in the 2000 questionnaire were: 'basic school/vocational school/high school and/or vocational school/university or polytechnic'. The response options varied a little over time: for instance, in the 2013 questionnaire there was a response option 'no education', which was removed again in the 2015 questionnaire. For the analyses, parental education was dichotomized as parental basic education only (including the response alternative 'no education') versus other. Parental unemployment was elicited as follows: 'Have your parents been unemployed or laid off work during the

past year?' The response alternatives were the same in all questionnaires: 'neither/one parent/both parents'. The family structure was elicited as follows: 'My family consists of...'. The response options in the 2000 questionnaire were: 'mother and father/mother and stepfather/father and stepmother/mother only/father only/spouse/other caregiver'. The response options varied slightly over time. For the analyses, family structure was dichotomized as living with both parents versus other. In this paper, all three variables are referred to as socioeconomic adversities. In addition, a variable 'cumulative socioeconomic adversity' was created, in which all three socioeconomic variables were combined: a score of 0 stood for having no socioeconomic adversities (living with both parents, no parental unemployment and at least one parent with higher than basic education) and a score of 4 stood for having all socioeconomic adversities studied (not living with both parents, both parents unemployed, both parents with basic education only). The prevalence of socioeconomic adversities is presented elsewhere (30).

Statistical analyses

All statistical analyses were conducted using SPSS software (Version 24). Distributions of delinquency and socioeconomic adversities for both sexes during the time period 2000-2015 are presented in Table 1. Bivariate associations were studied using binomial logistic regression results shown as odds ratios with 95 % confidence intervals. Delinquency was entered as dependent variable. In the first model, categorical time periods (2000-2001, 2002-2003, 2004-2005, 2006-2007, 2008-2009, 2010-2011, 2012-2013, 2014-2015) were entered as independent factors using the time period 2000-2001 as a reference category. In the second model, family structure (living with both parents/other), parental unemployment in the past year (neither/one parent/both parents) and parental education (both parents basic education only/other) were entered as independent factors one at a time. In the third model, the file was split according to categorical time periods and cumulative socioeconomic adversity was entered as an independent factor.

TABLE 1. Delinquency and socioeconomic adversities among Finnish boys and girls in the 8th and 9th grades of comprehensive school.

	Boys (*n* = 381,527)	Girls (*n* = 376,814)	*p*
Age (Mean (SD))	15.4 (0.7)	15.3 (0.6)	< 0.001
Delinquency			< 0.001
Yes	11.0	6.4	
No	81.2	87.0	
Missing	7.7	6.6	
Lives with both parents			< 0.001
Yes	74.4	73.7	
No	23.3	25.1	
Missing	2.3	1.2	
Both parents only basic education			< 0.001
Yes	5.6	5.9	
No	86.8	87.5	
Missing	7.6	6.6	
Parental unemployment past year			< 0.001
No	70.9	69.9	
One parent	23.6	25.6	
Both parents	3.2	3.3	
Missing	2.3	1.2	

TABLE 2. Delinquency over time among Finnish boys and girls in the 8th and 9th grades of comprehensive school

	2002-2003	2004-2005	2006-2007	2008-2009	2010-2011	2012-2013	2014-2015
Boys	0.6 (0.6-0.7)	0.5 (0.5-0.5)	0.5 (0.4-0.5)	0.5 (0.5-0.6)	0.5 (0.5-0.6)	0.5 (0.5-0.6)	0.4 (0.4-0.5)
Girls	0.6 (0.5-0.6)	0.5 (0.4-0.5)	0.4 (0.4-0.4)	0.6 (0.5-0.6)	0.6 (0.6-0.7)	0.5 (0.5-0.6)	0.3 (0.3-0.4)

Note. OR (95% CI). Time period 2000-2001 used as a reference category

Results

Distributions of delinquency and socioeconomic adversities for both sexes during the time period 2000-2015 are presented in Table 1. Delinquency was more common amongst boys than girls: in the whole sample, 11 % of boys and 6 % of girls scored to the 90th percentile in delinquent behavior (Table 1). At the overall level, no significant changes were observed in the prevalence of delinquency amongst either boys or girls (Table 2).

Associations between delinquency and socioeconomic adversities are presented in Table 3. Delinquency was associated with all three socioeconomic adversities studied. Delinquency was more common amongst adolescents with parental basic education only compared to adolescents with higher parental education, and amongst adolescents not living with both parents compared to adolescents living with both parents. Delinquency was also positively associated with parental unemployment in the past year. The more socioeconomic adversities accumulated, the more likely was delinquency.

TABLE 3. Delinquency by socioeconomic adversities among Finnish boys and girls in the 8th and 9th grades of comprehensive school

	Boys	Girls
Family structure		
Both parents	ref	ref
Not living with both parents	1.9 (1.9-1.9)	1.9 (1.8-1.9)
Both parents with low education		
No	ref	ref
Yes	1.7 (1.6-1.8)	1.5 (1.4-1.6)
Parental unemployment		
Neither parent	ref	ref
One parent	1.5 (1.5-1.5)	1.6 (1.6-1.7)
Both parents	3.9 (3.8-4.1)	3.2 (3.0-3.4)

Note. OR (95% CI)

Differences in delinquency between socioeconomic groups increased over the study period. Although the prevalence of delinquency varied only slightly between years amongst adolescents with least socioeconomic adversities, it increased amongst adolescents with most socioeconomic adversities amongst both sexes (Table 4). Similarly, although the ORs for delinquency varied only slightly amongst adolescents with least socioeconomic adversities, they increased amongst adolescents with most socioecomic adversities (Table 5).

Discussion

In this study, we found that delinquency was associated with socioeconomic adversities amongst Finnish adolescents. Delinquency was more common among boys and girls with parental basic education only than amongst adolescents with higher parental education. Delinquency was also positively associated with not living with both parents and parental unemployment in the past year. The more socioeconomic adversities accumulated, the more likely was delinquency. Most importantly, although changes in the prevalence of delinquency were modest in the overall population, delinquency increased significantly amongst adolescents with most socioeconomic adversities.

The bivariate associations between socioeconomic adversities and delinquency were in agreement with those reported in earlier research (20, 25, 26, 39-43). Low parental education, parental unemployment and a non-traditional family structure are all associated with economic hardship in the family, which is a risk factor of delinquency (44-46). Also the prevalence of substance use and mental health problems, which are associated with delinquency, is higher amongst low-SES adolescents (47-49). Parental monitoring is a central protective factor against delinquency, and lower levels of parental monitoring in low-SES families may partly explain why these adolescents engage more in delinquent behavior (50, 51). Adolescents with socioeconomic adversities are also less likely to be committed to school and academic performance and more likely to get involved in peer groups that engage in delinquent behavior (52, 53).

Our most important finding was that differences in delinquency according to SES increased significantly amongst Finnish adolescents between 2000 and 2015. The finding is novel as changes in delinquency according to SES have not been studied previously. However, increased socioeconomic disparities have been observed in many other areas of adolescent health and well-being, such as smoking and bullying at school (27, 28, 30, 54-56). Why differences in delinquency have increased amongst adolescents in past decades is not known. According to Willis (57), some adolescents from low-SES background may adopt low SES as a part of their identities. Therefore, low-SES adolescents may perceive certain behaviors that are more common amongst people from lower socioeconomic backgrounds, such as smoking and delinquency, as a means of reinforcing their identities. It is possible that the identity processes of adolescents from different socioeconomic backgrounds are diverging in a way which has led to increased socioeconomic disparities in delinquency. Also societal changes, such as changes in income distribution, increased long-term unemployment and school inequalisation, may have contributed to low-SES adolescents being worse off than earlier (58, 59).

TABLE 4. Delinquency over time by cumulative socioeconomic adversity among Finnish boys and girls in the 8th and 9th grades of comprehensive school

	2000-2001	2002-2003	2004-2005	2006-2007	2008-2009	2010-2011	2012-2013	2014-2015	*p**
Boys									
Number of sociodemographic adversities									
0	9.1 (1,851/20,280)	10.4 (2,792/26,737)	8.1 (2,289/28,427)	7.3 (2,230/30,572)	9.0 (2,640/29,479)	8.7 (2,291/26,408)	7.9 (1,764/22,457)	5.7 (642/11,238)	< 0.001
1	12.2 (1,551/12,728)	14.8 (2,183/14,775)	11.0 (1,676/15,212)	10.6 (1,551/14,605)	12.3 (1,841/14,917)	12.4 (1,885/15,241)	11.3 (1,700/15,016)	9.4 (773/8,195)	< 0.001
2	18.5 (869/4,696)	19.9 (998/5,005)	15.6 (762/4,874)	17.7 (791/4,478)	18.2 (851/4,664)	18.2 (923/5,067)	17.1 (941/5,495)	12.5 (394/3,158)	< 0.001
3	26.9 (242/898)	26.7 (228/854)	26.2 (225/859)	31.0 (221/714)	30.0 (200/634)	29.6 (262/886)	26.0 (230/886)	24.0 (129/538)	< 0.001
4	46.4 (51/110)	63.1 (82/130)	58.0 (69/119)	72.7 (96/132)	74.1 (106/143)	67.6 (119/176)	64.7 (145/224)	73.1 (144/197)	< 0.001
Girls									
Number of sociodemographic adversities									
0	5.0 (972/19,334)	5.2 (1,291/24,946)	4.1 (1,110/26,882)	3.8 (1,121/29,410)	5.1 (1,460/28,625)	5.4 (1,375/25,437)	4.2 (913/21,970)	2.6 (290/11,269)	< 0.001
1	7.1 (907/12,767)	7.5 (1,098/14,563)	6.3 (959/15,168)	6.1 (942/15,445)	7.9 (1,249/15,846)	8.8 (1,371/15,644)	6.9 (1,051/15,316)	4.3 (366/8,577)	< 0.001
2	10.4 (542/5,188)	11.0 (591/5,360)	8.2 (465/5,662)	9.0 (456/5,062)	10.4 (529/5,085)	12.8 (741/5,785)	10.0 (615/104)	6.8 (243/3,556)	< 0.001
3	14.2 (137/968)	14.2 (136/960)	14.6 (129/885)	16.0 (120/749)	18.1 (138/764)	16.8 (181/1,078)	14.9 (159/1,068)	9.0 (59/656)	< 0.001
4	22.4 (19/85)	25.8 (24/93)	38.2 (34/89)	37.8 (37/98)	51.0 (52/102)	47.9 (78/163)	40.1 (69/172)	51.1 (47/92)	< 0.001

Note. % (n/N); **p*-values were calculated by Mantel–Haenzel χ^2 test

TABLE 5. Delinquency over time by cumulative socioeconomic adversity among Finnish boys and girls in the 8th and 9th grades of comprehensive school

	2000-2001	2002-2003	2004-2005	2006-2007	2008-2009	2010-2011	2012-2013	2014-2015
Boys								
Number of sociodemographic adversities								
1	1.3 (1.2-1.4)	1.5 (1.4-1.6)	1.4 (1.3-1.5)	1.5 (1.4-1.6)	1.4 (1.3-1.5)	1.5 (1.4-1.6)	1.5 (1.4–1.6)	1.7 (1.5–1.9)
2	1.9 (1.8-2.1)	2.2 (2.0-2.3)	2.1 (2.0-2.3)	2.8 (2.5-3.0)	2.3 (2.1-2.5)	2.4 (2.2-2.6)	2.4 (2.2–2.7)	2.4 (2.1–2.7)
3	3.0 (2.5-3.5)	3.1 (2.7-3.7)	4.1 (3.5-4.9)	5.9 (5.0-7.0)	4.6 (3.8-5.4)	4.5 (3.9-5.3)	4.2 (3.5–4.9)	5.4 (4.3–6.7)
4	6.6 (4.3-10.0)	15.7 (10.9-22.7)	17.2 (11.8-25.0)	35.3 (23.8-52.3)	31.8 (21.5-47.1)	24.0 (17.2-33.4)	23.3 (17.4–31.0)	50.5 (35.9–71.0)
Girls								
Number of sociodemographic adversities								
1	1.3 (1.2-1.5)	1.5 (1.4-1.6)	1.6 (1.4-1.7)	1.6 (1.5-1.8)	1.6 (1.5-1.7)	1.7 (1.6-1.8)	1.7 (1.6–1.9)	1.7 (1.4–2.0)
2	1.9 (1.7-2.1)	2.3 (2.1-2.5)	2.1 (1.9-2.3)	2.5 (2.2-2.8)	2,2 (2.0-2.4)	2.6 (2.4-2.8)	2.6 (2.3–2.9)	2.8 (2.4–3.3)
3	2.5 (2.0-3.0)	3.0 (2.5-3.7)	4.0 (3.3-4.8)	4.8 (3.9-5.9)	4.1 (3.4-5.0)	3.6 (3.0-4.2)	4.1 (11.5–21.5)	3.8 (2.8–5.0)
4	5.3 (3.0-9.2)	6.3 (3.9-10.1)	15.0 (9.7-23.2)	16.0 (10.5-24.2)	20.3 (13.6-30.2)	15.9 (11.6-21.7)	15.7 (11.5–21.5)	40.8 (26.5–62.7)

Note. OR (95 % CI). Adolescents in the same time period living with both parents, with at least one parent with higher than basic education and both parents employed used as a reference category

Methodological considerations

This study has some limitations. First, self-report data are susceptible to recall bias. Adolescents may perceive parental education difficult to recall, which may explain why the proportion of missing responses is a little higher on that question than on other questions. However, the proportions of missing responses on all questions studied were very small and therefore hardly affected the results. Second, mischievous responding must be considered in self-report studies. Mischievous responders are defined as 'young people who provide extreme, and potentially untruthful, responses to multiple questions' (60). The extent of mischievous responding was not assessed in this study. However, there is no reason to assume that the prevalence of mischievous responding would have changed drastically over years and therefore affected the results.

Despite the limitations, this study has several strengths. It is based on an exceptional nationwide time series study with a long time span and a large sample size consisting of Finnish 8th and 9th graders (n = 761,278) and a high participation rate (43-82 %). The sampling and timing of the study were held constant over the study years. Self-reported delinquency uncovers considerably more incidents than official crime statistics, and anonymity is likely to reduce the biasing effect of social desirability in the responses (38). The questionnaire included several different measures of family SES that were held constant across years, which enabled us to study the association of delinquency with several proxy measures and also a composite measure of SES.

Clinical significance

Socioeconomic adversities are a central risk factor of delinquency amongst adolescents, and it seems that in the twenty-first century delinquency has become even more common amongst adolescents with low SES. Therefore, socioeconomic adversities should be considered in the prevention of delinquency as well as delinquency interventions.

Conflicts of interest

The authors declare no conflicts of interest.

References

1. Remschmidt H, Walter R. What becomes of delinquent children?: results of the Marburg child delinquency study. Dtsch Arztebl Int 2010;107(27):477-83.

2. Murray J, Farrington DP. Risk factors for conduct disorder and delinquency: key findings from longitudinal studies. Can J Psychiatry 2010;55(10):633-42.

3. Young S, Greer B, Church R. Juvenile delinquency, welfare, justice and therapeutic interventions: a global perspective. BJPsych Bull 2017;41(1):21-9.

4. Coker KL, Smith PH, Westphal A, Zonana H V., McKee SA. Crime and psychiatric disorders among youth in the US population: an analysis of the national comorbidity survey–adolescent supplement. J Am Acad Child Adolesc Psychiatry 2014;53(8):888-98.

5. Bjorkenstam E, Bjorkenstam C, Vinnerljung B, Hallqvist J, Ljung R. Juvenile delinquency, social background and suicide – a Swedish national cohort study of 992 881 young adults. Int J Epidemiol. 2011;40(6):1585-92.

6. Australian Bureau of Statistics. 2018 [cited 2018 Nov 22]. Available from: http://www.abs.gov.au/ausstats/abs@.nsf/mf/4519.0

7. Youth Justice Statistics 2014/15. 2016 [cited 2018 Nov 22]. Available from: https://www.gov.uk/government/collections/youth-justice-statistics

8. Elonheimo H. Evidence for the crime drop: survey findings from two Finnish cities between 1992 and 2013. J Scand Stud Criminol Crime Prev 2014;15(2):209-17.

9. Svensson R, Ring J. Trends in Self-Reported youth crime and victimization in Sweden, 1995-2005. J Scand Stud Criminol Crime Prev 2007;8(2):185-209.

10. Moffitt TE. The New Look of behavioral genetics in developmental psychopathology: gene-environment interplay in antisocial behaviors. Psychol Bull 2005;131(4):533-54.

11. Koolhof R, Loeber R, Wei EH, Pardini D, D'escury AC. Inhibition deficits of serious delinquent boys of low intelligence. Crim Behav Ment Heal 2007;17(5):274-92.

12. Sailas ES, Feodoroff B, Virkkunen M, Wahlbeck K. Mental disorders in prison populations aged 15-21: national register study of two cohorts in Finland. BMJ 2005;330(7504):1364-5.

13. Robertson AA, Dill PL, Husain J, Undesser C. Prevalence of mental illness and substance abuse disorders among incarcerated juvenile offenders in Mississippi. Child Psychiatry Hum Dev 2004;35(1):55-74.

14. Mann EA, Reynolds AJ. Early Intervention and juvenile delinquency prevention: evidence from the Chicago longitudinal study. Soc Work Res 2006;30(3):153-67.

15. Mersky JP, Topitzes J, Reynolds AJ. Unsafe at any age: linking childhood and adolescent maltreatment to delinquency and crime. J Res Crime Delinq 2012;49(2):295-318.

16. Haynie DL, Osgood DW. Reconsidering peers and delinquency: how do peers matter? Soc Forces 2005;84(2):1109-30.

17. Krieger N, Williams DR, Moss NE. Measuring social class in us public health research: concepts, methodologies, and guidelines. Annu Rev Public Health 1997;18(1):341-78.

18. Galobardes B, Shaw M, Lawlor DA, Lynch JW, Davey Smith G. Indicators of socioeconomic position (part 1). J Epidemiol Community Health 2006;60(1):7-12.

19. Galobardes B, Shaw M, Lawlor DA, Lynch JW, Davey Smith G. Indicators of socioeconomic position (part 2). J Epidemiol Community Health 2006;60(2):95-101.

20. Sourander A, Elonheimo H, Niemelä S, Nuutila A-M, Helenius H, Sillanmäki L, et al. Childhood predictors of male criminality: a prospective population-based follow-up study from age 8 to late adolescence. J Am Acad Child Adolesc Psychiatry 2006;45(5):578-86.

21. Isir AB, Tokdemir M, Küçüker H, Dulger HE. Role of family factors in adolescent delinquency in an Elazig/Turkey reformatory. J Forensic Sci 2007;52(1):125-7.

22. Elonheimo H, Sourander A, Niemelä S, Nuutila A-M, Helenius H, Sillanmäki L, et al. Psychosocial correlates of police-registered youth crime. A Finnish population-based study. Nord J Psychiatry 2009;63(4):292-300.

23. Goodnight JA, D'Onofrio BM, Cherlin AJ, Emery RE, Van Hulle CA, Lahey BB. Effects of Multiple maternal relationship transitions on offspring antisocial behavior in childhood and adolescence: a cousin-comparison analysis. J Abnorm Child Psychol 2013;41(2):185-98.

24. Elonheimo H, Sourander A, Niemelä S, Helenius H. Generic and crime type specific correlates of youth crime: a Finnish population-based study. Soc Psychiatry Psychiatr Epidemiol 2011;46(9):903-14.

25. Hay C, Fortson EN, Hollist DR, Altheimer I, Schaible LM. Compounded risk: the implications for delinquency of coming from a poor family that lives in a poor community. J Youth Adolesc 2007;36(5):593-605.

26. Paternoster R, Brame R. Multiple routes to delinquency? A test of developmental and general theories of crime. Criminology 1997;35(1):49-84.

27. Torikka A, Kaltiala-Heino R, Luukkaala T, Rimpelä A. Trends in alcohol use among adolescents from 2000 to 2011: the role of socioeconomic status and depression. Alcohol Alcohol 2017;52(1):95-103.

28. Torikka A, Kaltiala-Heino R, Rimpelä A, Marttunen M, Luukkaala T, Rimpelä M. Self-reported depression is increasing among socio-economically disadvantaged adolescents – repeated cross-sectional surveys from Finland from 2000 to 2011. BMC Public Health 2014;14(1):408.

29. Ahlborg M, Svedberg P, Nyholm M, Morgan A, Nygren JM. Socioeconomic inequalities in health among Swedish adolescents – adding the subjective perspective. BMC Public Health 2017;17(1):838.

30. Knaappila N, Marttunen M, Fröjd S, Lindberg N, Kaltiala-Heino R. Socioeconomic trends in school bullying among Finnish adolescents from 2000 to 2015. Child Abuse Negl 2018;86:100-8.

31. Aizer A, Doyle J, Jr. Juvenile incarceration, human capital and future crime: evidence from randomly-assigned judges. National Bureau of Economic Research. NBER Working Paper No. 19102, Issued in June 2013 Available from: http://www.nber.org/papers/w19102

32. Welty LJ, Hershfield JA, Abram KM, Han H, Byck GR, Teplin LA. Trajectories of substance use disorder in youth after detention: a 12-year longitudinal study. J Am Acad Child Adolesc Psychiatry 2017;56(2):140-8.

33. Fazel S, Doll H, Långström N. Mental disorders among adolescents in juvenile detention and correctional facilities: a systematic review and metaregression analysis of 25 surveys. J Am Acad Child Adolesc Psychiatry 2008;47(9):1010-9.

34. Kohm SA. Spatial dimensions of fear in a high-crime community: fear of crime or fear of disorder? Can J Criminol Crim Justice 2009;51(1):1-30.

35. Hinkkanen V. Rikollisuuden kustannukset. Rikollisuustilanne 2012. Rikollisuus ja seuraamusjärjestelmä tilastojen valossa. Oikeuspoliittisen tutkimuslaitoksen tutkimuksia [The cost of crime. Crime situation and crime system in the light of statistics. Research by the Institute for Legal Studies, Finland] 2013;264:421-30.

36. Junger-Tas J, Terlouw G-J, Klein MW. Delinquent behavior among young people in the western world: first results of the international self-report delinquency study. Kugler; 1994.

37. Zhang S, Benson T, Deng X. A test-retest reliability assessment of the international self-report delinquency instrument. J Crim Justice 2000;28(4):283-95.

38. Savioja H, Helminen M, Fröjd S, Marttunen M, Kaltiala-Heino R. Delinquency and sexual experiences across adolescence: does depression play a role? Eur J Contracept Reprod Heal Care 2017;22(4):298-304.

39. Bartlett R, Holditch-Davis D, Belyea M. Clusters of problem behaviors in adolescents. Res Nurs Health 2005;28(3):230-9.

40. Maughan B, Collishaw S, Meltzer H, Goodman R. Recent trends in UK child and adolescent mental health. Soc Psychiatry Psychiatr Epidemiol 2008;43(4):305-10.

41. Morgan PL, Li H, Cook M, Farkas G, Hillemeier MM, Lin Y. Which kindergarten children are at greatest risk for attention-deficit/hyperactivity and conduct disorder symptomatology as adolescents? Sch Psychol Q 2016;31(1):58-75.

42. Collishaw S, Goodman R, Pickles A, Maughan B. Modelling the contribution of changes in family life to time trends in adolescent conduct problems. Soc Sci Med 2007;65(12):2576-87.

43. Harris-Mckoy DE. Examining parental control, parent-adolescent relationship, delinquency, and criminal behavior. 2013 [Dissertation]. Available from: http://diginole.lib.fsu.edu/islandora/object/fsu:183746/datastream/PDF/view

44. Kim Y, Hagquist C. Trends in adolescent mental health during economic upturns and downturns: a multilevel analysis of Swedish data 1988-2008. J Epidemiol Community Health 2018;72(2):101-8.

45. Baum A, Fleming R, Reddy DM. Unemployment stress: loss of control, reactance and learned helplessness. Soc Sci Med 1986;22(5):509-16.

46. Agnew R, Matthews SK, Bucher J, Welcher AN, Keyes C. Socioeconomic status, economic problems, and delinquency. Youth Soc 2008;40(2):159-81

47. Marmot MG. Understanding social inequalities in health. Perspect Biol Med 2003;46(3x):S9-23.

48. Marmot M, Wilkinson RG. Social organization, stress, and health. In: Marmot M, Wilkinson RG Social determinants of health. Oxford University Press; 2005, pp. 6-30.

49. Grucza RA, Krueger RF, Agrawal A, Plunk AD, Krauss MJ, Bongu J, et al. Declines in prevalence of adolescent substance use disorders and delinquent behaviors in the USA: a unitary trend? Psychol Med 2018;48(09):1494-503.

50. Hartinger-Saunders RM, Rine CM, Wieczorek W, Nochajski T. Family level predictors of victimization and offending among young men: rethinking the role of parents in prevention and interventions models. Child Youth Serv Rev 2012;34(12):2423-32.

51. Kaufman TML, Kretschmer T, Huitsing G, Veenstra R. Why does a universal anti-bullying program not help all children? Explaining persistent victimization during an intervention. Prev Sci 2018;19(6):822-32.

52. Ferguson H, Bovaird S, Mueller M. The impact of poverty on educational outcomes for children. Paediatr Child Health 2007;12(8):701-6.

53. Moss HB, Lynch KG, Hardie TL. Affiliation with deviant peers among children of substance dependent fathers from pre-adolescence into adolescence: associations with problem behaviors. Drug Alcohol Depend 2003;71(2):117-25.

54. Frederick CB, Snellman K, Putnam RD. Increasing socioeconomic disparities in adolescent obesity. Proc Natl Acad Sci U S A 2014;111(4):1338-42.

55. Matthiessen J, Stockmarr A, Biltoft-Jensen A, Fagt S, Zhang H, Groth MV. Trends in overweight and obesity in Danish children and adolescents: 2000-2008 – exploring changes according to parental education. Scand J Public Health 2014;42(4):385-92.

56. Doku D, Koivusilta L, Rainio S, Rimpelä A. Socioeconomic differences in smoking among Finnish adolescents from 1977 to 2007. J Adolesc Health 2010;47(5):479-87.

57. Hagan J, Willis P. Learning to labor: How working class kids get working class jobs. Contemp Sociol 1996;25(4):451.

58. Rotko T, Aho T, Mustonen N, Linnanmäki E. Bridging the Gap? Review into actions to reduce health inequalities in Finland 2007–2010. Terveyden ja hyvinvoinnin laitos (THL); 2011;116 p. Available from: http://www.julkari.fi/handle/10024/80012

59. Karvonen S, Tokola K, Rimpelä A. Well-being and academic achievement: differences between schools from 2002 to 2010 in the Helsinki metropolitan area. J Sch Health 2018;88(11):821-9.

60. Robinson-Cimpian JP. Inaccurate estimation of disparities due to mischievous responders. Educ Res 2014;43(4):171-85.

PUBLICATION IV

Changes in Cannabis Use According to Socioeconomic Status Among Finnish Adolescents from 2000 to 2015

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